FISHING FOR POLLOCK IN A SEA OF CHANGE: A HISTORY AND ANALYSIS

OF THE BERING SEA POLLOCK FISHERY

By

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FISHING FOR POLLOCK IN A SEA OF CHANGE: A HISTORY AND ANALYSIS OF THE BERING SEA POLLOCK FISHERY

A

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Abstract

The development and evolution of the eastern Bering Sea fishery for walleye pollock (*Theragra chalcogramma*) is retraced, its current economic and institutional structure is modeled, and the resiliency of that structure to substantive changes in pollock biomass and fuel costs is explored. Small variations in exvessel prices, total allowable catches, or allocation of catches between seasons and among industry sectors can lead to large changes to first wholesale revenues. Similarly, changes in fuel prices, changes in technology, changes in regulation, and changes in the spatial distribution of catches can lead to changes in harvesting or processing costs. Together, these changes affect the relative profitability of the inshore and offshore sectors, which can, in turn, affect the benefits that accrue to communities, the evolution of regulation, and create pressure to reallocate sector shares. The model indicates that first wholesale revenues are maximized when pollock harvests are maximized. However, legal barriers to the transfer of allocations between sectors can lead to under-harvests when product prices are low, fuel costs are high, or when the most productive fishing grounds are in the northwest regions of the eastern Bering Sea Exclusive Economic Zone.

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General Introduction

The Eastern Bering Sea (EBS) fishery for walleye pollock (*Theragra chalcogramma*) yields gross exvessel revenues of over $300 million and a first wholesale value of over $1.2 billion. The annual total allowable catch (TAC) has ranged from 813,000 mt to 1,494,900 mt over the last 30 years, making it the largest fishery by volume in the United States. During the 1960s and 1970s, Alaska pollock was harvested by foreign fleets composed primarily of Japanese and Russian vessels, who then processed the groundfish into surimi, a fish-based protein paste. The passage of the Fishery Conservation and Management Act (FCMA) in 1976 pushed the "Americanization" of the fishery, progressively increasing the number of U.S. harvesters and processors through the 1980s and 1990s. While certain domestic processors invested in fillet technology, surimi production remained the primary flesh product primarily due to the race-for-fish that ensued from the rapid build-up in harvesting and processing capacity. Under the race-for-fish, it was not advantageous for processors to focus on the more time intensive fillet product; instead, the focus remained on the higher throughput surimi, causing processors to maximize their allocation of the harvests rather than maximizing the per-unit value of their catches. It wasn't until the passage of the American Fisheries Act (AFA) in 1998 that fishermen from various sectors of that the fishery were permitted to form harvesting cooperatives, in which privately negotiated contracts provided each vessel a guaranteed portion of the TAC. The catcher processor sector, consisting of factory trawlers which harvest and process fish at-sea and catcher vessels that delivered to them, formed cooperatives in 1999. In 2000, the shoreside sector, composed of harvesting only catcher/vessels that and the shoreside processors they delivered to, as well as the mothership sector, composed of harvesting only catcher/vessels that and the at-sea processors they delivered to also formed cooperatives. At the same time, the Western Alaska Community Development Quota (CDQ) program realized immense benefits from the AFA. The six CDQ entities represent 65 western Alaska communities and are tasked with providing opportunities for community residents to benefit from wealth associated with exploitation of marine resources available near their communities. Ten-percent of the pollock TAC is allocated to these groups, who then lease their quota to AFA-qualified fishing vessels operating in the at-sea and shoreside sectors.

Under the AFA, pollock harvesters and processors have enjoyed increased stability and revenues. Processors and catcher processors have been able to look beyond simply processing the largest amount of fish before the end of the fishing season and instead focus on maximizing revenues through increased capital expenditures into technology, expanded global markets, and optimized product mix. As a result, the fishery has experienced an unparalleled period of stability under which fishermen, processors, and CDQ groups have benefitted.

Recently, the pollock fishery has had to deal with stressors including regulations intended to reduce Pacific salmon (*Oncorhynchus spp.*) bycatch, regulations intended to prevent jeopardy to Steller sea lions (*Eumetopias jubatus*) or adverse modification of their habitat, elevated fuel costs, and northwestward shifts in the center of abundance of pollock. These stressors affect the absolute and relative profitability of the inshore and at-sea sectors and the benefits that accrue to Western Alaskans through the CDQ allocations. Although the stressors have impacted all sectors, the inshore sector has been disproportionately impacted. During the 2007 B-season, a combination of low product prices and high fuel prices led the inshore sector to leave over 10% of its allocation unharvested. Under the AFA, this fish could not be transferred or leased outside the inshore sector, thereby depriving the inshore cooperative of potential lease revenues and depriving other sectors and CDQ groups of the opportunity to profit from harvesting the balance of the inshore allocation.

Chapter 1 details the development and history of the eastern Bering Sea pollock fishery. This young fishery has rapidly evolved since foreign fleets pioneered it in the 1960s. Extension of U.S. jurisdiction under the Fishery Conservation and Management Act of 1976 provided opportunity and authority to “Americanize” the fishery. As the number of U.S.-flagged fishing vessels and catcher-processors increased in the late 1980s and 1990s, fishing capacity outstripped the total allowable catch. The resulting race-for-fish led to compressed seasons and to competition between the inshore and at-sea sectors. The competition played out in a race to maximize catch-per-day on the fishing grounds and to lobbying the North Pacific Fishery Management Council and Congress for favorable sector allocations and contesting unfavorable allocations in court.

Passage of the American Fisheries Act of 1998 (AFA) ended the between sector allocation battle and provided each sector with the authority to enter into voluntary agreements to share the sector allocation. These changes in the governance of the fishery allow the sectors to switch from maximizing catch rates to maximizing the per-unit net revenue of their catches. Chapter 1 examines the fishermen, processors, and issues that provided the impetus for the development, management, and evolution of the pollock fishery from past to present and its implications on the future of the fishery.

Chapter 2 documents the specification, estimation, validation, and implications of a simultaneous-equation equilibrium supply-demand model of international walleye pollock. The model is used to examine the effects of variability in landings and changes in pollock fillet, surimi, and roe production, on first wholesale prices and revenues to the inshore and at-sea sectors. The market for U.S. pollock products has evolved significantly since the early 1990s when processors focused on selling roe and surimi to Japan. The formation of harvesting cooperatives created the opportunity to expand the range of products and to enter new markets. Chapter 2 characterizes current market structure and explores the effect of variation in product prices and production costs on the mix of product forms and first wholesale revenues for the fishery as a whole and for each sector and for the CDQs.

CHAPTER 1: An Historical Analysis of the Bering Sea Pollock Fishery[1]

Introduction

Theragra chalcogramma, also known as Alaska or walleye pollock, is a species of fish found in the Pacific Ocean from the Sea of Okhotsk in Russia to the shores of Washington in the United States. Pollock is considered both a whitefish, based on the white-to-grayish color of its flesh, and a groundfish, due to its schooling behavior near the bottom, although schools of younger fish are often found off the bottom. They are a member of the family *Gadide*, making them closely related to cod (*Gadus spp.*), whiting (*Merluccius productus)*, and haddock (*Melanogrammus aeglefinus*). While pollock is rarely served as fish of the day at the local restaurant, it is the most plentiful whitefish in the world, providing the world's highest-volume groundfish used for human consumption (Sjøholt 1998). The primary U.S. pollock harvests are taken in the eastern Bering Sea and the Aleutian Islands (BSAI)—although there is a smaller harvest in the Gulf of Alaska. The pollock fishery off the coast of Alaska is the largest U.S. fishery in terms of tonnage, with the BSAI yielding an annual average (1980-2009) harvest of over 1,200,000 metric tons (mt), or nearly 2.6 billion pounds (NMFS 2009c).

This enormous catch is processed into fillets, surimi, roe, and fishmeal and various other byproducts. The protein paste, surimi, created by a complex rinsing process of the meat, is used for a variety of final products and is a staple in the Japanese diet. Outside of Japan, the most familiar form of surimi is imitation crab, used in sushi such as the popular California rolls. Pollock fillets are a mainstay in fast food restaurants such as McDonalds and Wendy's, where the fish is breaded and fried and used for sandwiches. Pollock fillets are a common base for frozen breaded fish sticks and are used in Europe, and increasingly in the U.S., as a base for fish and chips. The roe, or fish eggs, are a popular gift giving treat given at holidays in Japan, and are enjoyed salted and spiced.

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[1] Strong, J. and K. R. Criddle. 2011. Fishing for pollock in a sea of change. Submitted to University of Alaska Press.

From these products, the pollock fishery represented an average annual first wholesale value of $1.1 billion between 1999 – 2008, making it, in 2008, the third most valuable fishery in the U.S. after Atlantic sea scallops (*Placopecten magellanicus*) and Gulf of Mexico shrimp (*Farfantepenaeus aztecus, Farfantepenaeu duorarum,* and *Litopenaeus setiferus*) (NMFS (2001b, 2005, 2009c, 2009d)).

In spite of its current value, the fishery for pollock off the U.S. coast is a recent development, having started in the early 1960s. Even into the 1980s, foreign fleets dominated the fishery, with Japan and Russia being the largest harvesters in waters offshore the U.S. It wasn't until the extension of the U.S.'s marine boundaries and installation of a management structure through the passage of the Fishery Conservation and Management Act in 1976 that U.S. fishermen began harvesting of the resource, in what became known as Joint Venture operations. During this time period, fishery managers focused on the Americanization of the fishery and setting appropriate harvest levels. The push for the Americanization, as well as an increased awareness of the value of the pollock resource, led to the rapid development of U.S. harvesters and processors. With increased competition for pollock, a battle soon ensued between the entities processing at-sea (offshore) and those processing on shore or on vessels moored near shore (inshore). The battle over fish occurred in two arenas, with fishermen fighting at the regional fishery management council level and in the U.S. Congress and Senate. Congressional action led to the passage of the Anti-Reflagging Act, which unsuccessfully tried to limit foreign influence and investment in the pollock fishery. The fight moved on to the North Pacific Fishery Management Council, which passed regulations which created separate catch limits for the Inshore and Offshore sectors. The specific percentages of catch allocated to each sector further intensified the battle over resources—both at the Council and Senate level. With the rapid buildup of capacity and subsequent fight over fish came a period of instability in the pollock fishery—especially for the offshore processors—marked by bankruptcies and consolidation.

These battles over pollock allocations ended abruptly with the passage of the American Fisheries Act (AFA) in 1998, which circumvented the regional management council process with a congressionally designed three-sector allocation and laid the groundwork for the formation of cooperative harvest share agreements within each sector. The AFA effectively ended the race-for-fish, and created an unparalleled period of stability in the fishery. As an act of Congress, the regulations put forward under the AFA cannot be changed or altered without another act of Congress. Since the passage of the AFA, the pollock industry has been forced to deal with several stresses, including: closures of near shore fishing areas and seasonal apportionments intended to protect Steller sea lions (*Eumetopias jubatus*); regulatory actions to reduce Pacific salmon (*Oncorhynchus spp.*) bycatch; rising fuel costs; and environmentally induced shifts in the geographic distribution of pollock. Although fishery managers and fishermen have successfully dealt with these stressors, the AFA's inflexibility precludes transfers between sectors even when such transfers could be mutually advantageous, such as when low product prices and high operating costs could lead some fishermen to forego harvesting a portion of their allocation.

Initial Development of the Eastern Bering Sea Pollock Fishery

Despite the high abundance of pollock found in the Bering Sea, the pollock fishery is relatively young in terms of the world's major marine fisheries. For example, its cousin the Atlantic cod (*Gadus morhua*) was harvested and traded internationally by the Vikings as far back as 800 AD. Similarly, although fishing off the coast of Alaska has taken place for centuries, Alaska Natives focused their fishing effort on salmon (*Oncorhynchus sp.*), herring (*Clupea pallasi*), halibut (*Hippoglossus stenolepis*), rockfish (*Sebastes sp.*), Pacific cod (*Gadus macrocephalus*), eulachon (*Thaleichthys pacificus*), and miscellaneous other nearshore fish and shellfish species; it appears that pollock were only caught incidentally (NMFS 2002).

The first documented pollock fishing occurred off the coast of Asia in the late 18th century, but never developed into a large-scale fishery (Bailey et al. 1999). In 1929 and 1931, Japan sent a fishing trawler into the Eastern Bering Sea to explore the resources available, including pollock and yellowfin sole (*Pleuronectes asper*). In 1933, the Japanese government followed up on its surveys by sponsoring a commercial venture to harvest Eastern Bering Sea pollock as a means to earn foreign currency. Fishing continued through 1937, with a Japanese fleet consisting of a mothership, three to five conventional catcher-trawlers, and as many as eight bull (paired) trawlers. The catcher vessels normally fished within five miles of the mothership. After they filled their nets, they delivered the full codends (the closed end of the trawl net) to the mothership. The mothership, a ship built for processing fish at sea, accepted the nets and processed the pollock into fishmeal and fish oil. Finished products were shipped back to port, where they were mostly sold to Europe (Alverson et al. 1964).

After a three-year hiatus that coincided with the commencement of major new military conquests in China, Japan resumed pollock fishing in the eastern Bering Sea in 1940—but this time for a different purpose. Japanese military campaigns in China were straining food supplies, so instead of fishing for foreign currency, the Japanese pollock fishery began to fish to bolster domestic food supplies. As in 1933-1937, the Japanese sent one mothership and a fleet of nine to twelve catcher-vessels each year, but instead of processing pollock into fishmeal and fish oil, the mothership prepared the fish for human consumption, froze it, and shipped it back to Japan. Although the fishing was not profitable for the participating companies, it continued with government support through 1941. Open warfare with the U.S. and Allied Forces from 7 December 1941 through 14 August 1945 put a stop to Japanese fishing in the Eastern Bering Sea. While most of the Japanese catches from 1933-1937 and 1940-1941 were composed of Alaska pollock, yellowfin sole also constituted a large portion of the pre-WWII catches (Alverson et al. 1964).

Post World War II Pollock Fishery

Although Japan had limited commercial success with its pre-WWII pollock operations, the landscape for distant-water marine fisheries such as pollock changed in the post-war era. The war led to a rapid buildup of military institutions and personnel along the West Coast; and with concurrent shortages in animal protein supplies, the demand for fish increased as devastated countries were forced to search for new food sources (Alverson et al. 1964). Countries, such as Japan, were looking to feed the starving masses after the devastation of the war. U.S. General MacArthur realized that Japan's post-war food production system could not support her population of 80 million people. With the U.S. not utilizing Bering Sea or Gulf of Alaska pollock resources, MacArthur encouraged the Japanese to return to the Bering Sea to fish for pollock to feed their country. Nevertheless, it was 1954 before fishing resumed. Japan and other countries began globally expanding fishing operations to support their countries, with the eastern Bering Sea being a popular destination (Tillion 2003).

The end of World War II also led to a sharp downturn in industry that impacted many of the world's largest nations, such as Japan, Germany, and the Soviet Union. Development of distant-water fishing fleets provided a natural opportunity for increased jobs and industry—in addition to providing a new food source. The viability of these fleets was aided by technological advancements made during World War II. For example, wartime advancements in sonar aided in detecting fish schools. Wartime innovations in electronic navigation gave vessels better ability to navigate the high seas. Increased engine power allowed these vessels to travel more quickly and harvest more efficiently. New technologies also improved refrigeration on processing and barge vessels. The increased freezing capacity allowed vessels to fish longer, while increasing the quality and options for processed fish (Hornnes 2006).

These technological advancements led to the construction of the first modern vessel able to combine trawling and processing and stimulated a rapid expansion of distant-water fleets. The first factory trawler, the *Fairtry,* was launched in Scotland in 1954 by a Scottish whaling company, Christian Salvesen Ltd. The size of the vessel alone was impressive for its time. It was 280 feet long and had a gross tonnage of 2600 gross tons. More importantly, it included a stern ramp which allowed the *Fairtry*'s crew to pull the trawl net onto the deck via a ramp on the vessel's stern. Although this technique had been used in whaling, it had not previously been used in conjunction with trawling. Stern ramps proved to be much safer than traditional methods which brought fish aboard over the vessel's side. In addition to improved harvesting capability, the factory trawler included fish processing facilities, a refrigerating system to freeze processed fish and to hold them in frozen storage, and the ability to process waste products into fishmeal. The *Fairtry*'s factory contained an area under the trawl deck where fish were gutted and filleted using machinery manufactured in West Germany for land-based processing facilities, but never before used at-sea. The *Fairtry*'s refrigeration system was the newest and lightest system produced by Clarence Birdseye in the United States (Hornnes 2006). This combination of harvesting and processing technologies made the *Fairtry* a success.

The Soviet Union, Japan, and other countries quickly recognized the factory trawlers' potential as a means to make fishing for low-value species such as pollock profitable. Less than a year after the *Fairtry*'s introduction, the Soviets commissioned their first factory trawler, the *Pushkin*, from a West German shipyard; by 1956, they had ordered 23 more factory trawlers (Hornnes 2006).

Even before commissioning these factory trawlers, the Soviets had launched into development of a sophisticated system of motherships and support vessels. Each distant-water fleet typically included a cluster of motherships each escorted by a pair of 120 to 180 foot long trawlers. The trawlers delivered codends of fish to the mothership for processing, and were supported with additional refrigeration vessels between 240 and 400 feet long. Fish processed by the motherships or aboard the factory trawlers was transferred to cargo and provisioning vessels. The Soviet government made a huge investment—over 10 billion rubles between 1956 and 1975—to build the largest distant-water fleet in the world. By 1975, the Soviets had nearly 5,400 distant-water vessels, accounting for nearly half of the world's gross tonnage of such vessels. The Soviets dispatched this fleet across the world's seas, including the eastern Bering Sea which they began to fish in the late 1950s (Alverson et al. 1964; NMFS 2002; Hornnes 2006).

Japan also sought to rebuild its fishing fleet after World War II. Although the Japanese continued to fish with motherships and trawlers, they launched their first factory trawler less than two years after the debut of the *Fairtry*, and a second two years later (Hornnes 2006). As their distant-water fleet was rebuilt, the Japanese recommenced fishing in the Eastern Bering Sea in 1954, targeting a wide array of fish and invertebrates, including yellowfin sole, Pacific ocean perch (*Sebastes alutus*), and king crab (*Paralithodes sp.*). Yellowfin sole was of particular interest as a target species because, in 1960, Japanese scientists developed a technique to transform white-fleshed fish into surimi. Surimi, the generic name for the processed white protein paste, can be made from a variety of different types of fish. To produce surimi, fish are first filleted and then minced. Fat, blood, pigments and odorous substances are removed through repeated washing and dewatering. Fueled by this discovery, Japanese catches of the flatfish in the eastern Bering Sea reached a peak in 1962 when overfishing led to a decline of the stock. The reduction in catches of yellowfin sole from the Bering Sea coincided with a decline in the harvests of croaker(*Atrobucca nibe*, *Argyrosomus argenteus*, and *Pseudoscianena polytis*), another whitefish, off the coast of Japan, leaving the Japanese to look for a new fishmeal and surimi source (Natural Resources Consultants 1981; Park 2005; NMFS 2009c).

The Japanese then choose to focus their attention on pollock, since it was an abundant species that provided a high-quality surimi. Pollock quickly became the preferred fish of the surimi industry in Japan. The demand for pollock surimi in Japan grew so fast, that by 1979, there were 150 land-based surimi processing facilities, as well as over 3,000 facilities which processed surimi into value-added products such as chikuwa and kamaboko (Natural Resources Consultants 1981). The economies of scale provided by the large factory trawlers allowed the Japanese to capitalize on pollock harvests and accelerated the development of the Japanese factory trawler fleet. The Japanese fleet quickly grew, from four factory trawlers in 1964 to 42 in 1972, making them pioneers in the pollock fishery (Park 2005).

Rising Pollock Catches

The demand for pollock surimi in Japan, as well as the expansion of distant-water fleets, fueled a rapid increase in pollock harvests from the eastern Bering Sea. Catches of pollock grew from 174,792 mt in 1964 to a peak of 1,874,534 mt in 1972 (Figure 1.1). During the same era, worldwide harvests of pollock peaked at nearly 3 million metric tons (mmt). Japan was the only pollock harvester in waters off Alaska until 1968, when South Korea began harvesting small amounts of pollock. Russian fishing vessels joined the eastern Bering Sea pollock fishery in 1969. Despite the increased competition, Japan dominated the fishery, taking over 88% of the catches between 1964 and 1979. Russia was the only other major harvester of pollock during this era with an annual average 10% catch share—their peak catch was 16% in 1975. South Korea harvests over this time period represented about 1% of the total catches (Natural Resources Consultants 1981).

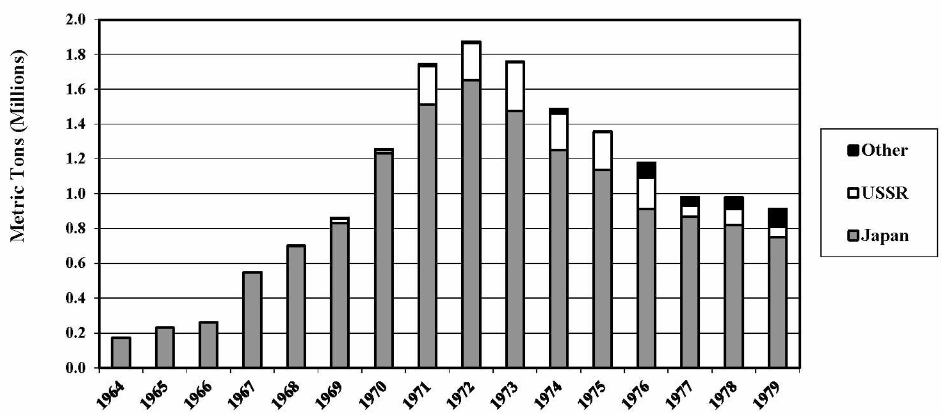

Figure 1.1. Foreign harvests of pollock in the Eastern Bering Sea (mt).
Source: Natural Resources Consultants (1981).

The rapid increase in pollock catches—to a level that may have been unsustainable—was consistent with standard operating procedures for distant-water fleets. These new fleets, equipped with efficient factory trawlers and mothership groups, were allowing countries to access marine resources across the globe. Smaller, less efficient vessels were being replaced by the factory trawlers, leading to a growth in catches of many marine species, both in the Eastern Bering Sea and across the globe (Hornnes 2006). By 1970, the Soviets' fleet alone contained more than 400 large, distant-water fishing and processing vessels. Distant-water fleets need large catches to sustain their operations, and typically focused their fishing on localized grounds until desired stocks were fished down to a level that was unprofitable. At that point, they continued the pattern of serial depletion on new grounds containing the next best species (Hornnes 2006). There are numerous examples of this across the globe, with two examples of this taking place in the early foreign fishing days off the coast of Alaska. The Japanese overfished yellowfin sole, before shifting their focus to pollock in 1962. The Soviets moved into the Gulf of Alaska in 1964 and pulse-fished Pacific Ocean perch, decimating local biomass until it was unprofitable and then moving on to waters off Oregon and Washington (NMFS 2002).

Global Movement towards Increased Marine Rights

Serial exploitation of fisheries was both a cause of changes in international law and a product of those anticipated changes. A movement to extend rights over marine coastal waters stirred among countries after World War II. This was a challenge to the international convention of freedom of the high seas, which had been recognized since the late-eighteenth century. The conventional view of the high seas was predicated on three assumptions. First, it was argued that the high seas themselves were not amenable to physical occupation. Second, conventional wisdom argued that the resources of the seas were inexhaustible. Finally, it was supposed that the seas were so vast that no one use of the seas could impose external costs on other uses (NMFS 2002). Under these conventional views, countries could not exercise authority over waters more than three miles off their coasts (cannon range). The rise of distant-water fleets, along with an increased recognition that all natural resources are finite, led countries to a push for extended jurisdiction over coastal waters. Countries were watching catches of marine species decline worldwide. Moreover, distant-water fleets became capable of spending an entire season in an area, with freighters handling the delivery of supplies and the transport of fish.

The United States, in foreshadowing of changes to come, laid the groundwork for extended coastal rights, with President Harry Truman issuing two executive orders in 1945. The first was the Truman Proclamation, which claimed rights to offshore minerals based on the concept of adjacency. The second, the U.S. Fisheries Proclamation of 28 September 1945, gave the government power to establish conservation zones in the high seas off the United States coast (Hornnes 2006). The United States did not enforce the Proclamation, but the Proclamation was important in that it asserted the United States' rights to offshore minerals. Other countries took even bolder steps. In 1946, Argentina and Panama asserted exclusive rights to fishery zones up to 200 nautical miles off their coastlines to lay claim to productive tuna (*Thunnus spp.*) fisheries. Peru and Chile followed suit in 1947 to claim control of the anchovetta (*Engraulis ringens*) resource. Between 1958 and 1975, Iceland gradually expanded its maritime claims to 200 miles, progressively forcing British fishermen off cod grounds; a conflict that came to be known as the Cod Wars. Thus pressure from and competition with distant-water fleets spurred unilateral declarations of extended jurisdiction.

The trend towards increased claims to extended jurisdictions had enormous implications for the newly formed distant-water fleets. The shallow nutrient-rich continental shelves where most of the fleets operated compose only 9% of the world's oceans, yet make up nearly 96% of the world's fisheries. Access to most of these shelves would be eliminated with the extension of 200 mile zones. During the 1960s and 1970s, for instance, nearly half of Japan's catches came from fisheries that would fall within other countries' 200-mile zones, with 90% of that coming from the North Pacific (Hornnes 2006). Indeed, it was speculated that factory trawlers, not fish, were headed for extinction. The distant-water fleets would not be able to survive under the low quotas assigned to them by coastal countries under the new, extended boundaries (Warner 1983). Consequently, distant-water fleets recognized that it was only a matter of time before they would lose access to desired fishing grounds and thus they were left with little incentive to harvest at sustainable rates. Instead, the fleets would deplete a fishery until it ceased to be profitable (and in the process, drive the fish biomass to dangerously low levels) before moving on to the next species or area. With the rapidly rising catches seen in to the early 1970s, the pollock fishery appeared to be the next in line to be decimated by the distant-water fleet.

Fishery Management

The decline in various fish stocks off the United States' coast was related to the lack of regulatory oversight limiting catches. During the 1960s, the United States had no unilateral fishery management authority over stocks more than 3 miles from the coast. With exception of international agreements over some species of groundfish in the Northwest Atlantic and for salmon in the North Pacific and Bering Sea, fish beyond the 3-mile boundary were open to distant water fleets. Although fishermen and fishery scientists were increasingly concerned about the effects of unregulated fishing in waters beyond the 3-mile limit, the United States had not extended its boundaries, and therefore, lacked the legal authority to control the large distant-water fleets that fished the Bering Sea (Cushing 1988). Efforts by U.S. fishery scientists to gather harvest data for North Pacific fisheries went largely unrewarded. Japan offered limited catch data; the Soviet Union offered even less. In an attempt to increase oversight and management of near shore fisheries, the United States extended its exclusive fishery zone to 12 miles under P.L. 89-658 on October 4, 1966. Under this legislation, the United States used U.S.-foreign bilateral agreements; these were the first attempts at fishery management in the Eastern Bering Sea (NMFS 2002; NPFMC 2006).

The negotiations over bilateral agreements were initiated in 1967 with Japan and the USSR. The first agreement over the harvest of groundfish was with Soviet Union in 1967, with further agreements negotiated in 1972-1973. The 1973-1974 bilateral agreements were probably the most important, because they imposed catch quotas on harvests of pollock and other species. The catch quotas limited the amount of fish each country was allowed to harvest based on the past three or four years' average catch. At this point, fishery managers were simply attempting to cap harvests until the different fish stocks were evaluated to determine what the actual harvest should be. The final bilateral negotiations with Japan took place in 1974 and with the Soviet Union in 1975. Although setting catch quotas through bilateral agreements was a progressive move, it had little effect, as each country wanted to be in charge of monitoring its own catches, thus there was no accountability (NMFS 2002).

Magnuson Fishery Conservation and Magnuson Act

In the 1970s, pressure started to mount in the United States for extended boundaries. With little ability to control the foreign fleets, there was concern that the resources in the Pacific would be depleted. There was also worry from salmon processors in Alaska that the Japanese would come in and start competing for salmon. As a result, what would later become known as the Magnuson Fishery Conservation and Management Act, originally started as a salmon-packing act (A. Brindle, personal communication). Senator Ted Stevens of Alaska also saw the potential for his state in expanding the boundaries. Stevens remarked:

> In January of 1970, I went to Kodiak and asked the Navy to fly me to the Pribilofs. There was an amphibious plane there, an Albatross, and we flew from Kodiak to the Pribilofs at fairly low level. I counted more than 90 foreign fishing vessels anchoraged (sic) there just off our state. And they had a bunch of little catcher boats going out from them. It really bothered me a great deal. (King 2009)

Stevens became the Congress's primary proponent for legislation to extend America's jurisdiction from 12 to 200 miles offshore; however, as a junior senator, his original bill went nowhere (King 2009).

Stevens eventually obtained the support of a senior senator, Warren Magnuson of Washington. Fishermen—many from Seattle—pushed for the expansion to a 200-mile boundary. The number of boats in the Alaska crab fishery, a majority of which were based out of Washington, was growing quickly, and there was a growing realization within the industry that such growth could not be sustained. Fisherman such as John Sjong, future owner of the first domestic factory trawler in the Bering Sea, realized that they would soon need to look for other species to harvest:

> There was a tremendous amount of boats joining the fishery. There was no way it could hold up. The writing was on the wall. We started to look elsewhere; what else could we fish? (Sjong 2003)

With the foreign fleets harvesting billions of pounds of fish yearly in the Eastern Bering Sea, it was natural for domestic fisherman to advocate for the expanded boundaries and the corresponding expansion in their fishing opportunities. "The groundfish resource was huge," stated Wally Pereyra, a leader in the development of the domestic pollock fleet. With new opportunities in mind, Seattle fishermen appealed to Congress under the mantra of "Americanization" (King 2009; Pereyra 2003). Of Senator Magnuson's push for a 200-mile exclusive zone, Clem Tillion remarks:

> It wasn't that Magnuson knew that much about fish, it's just that his friends were in the business, and as such, he was going to defend them. And he did a beautiful job. (Tillion 2003)

The extended boundaries not only had the fishermen's support, but the oil industry's as well. The oil and gas industry hoped to gain enormously from the protection of natural resources off the United States' coast. The oil industry was happy to let the fishermen take the lead. The publicity of the day was weathered, wind-reddened fisherman on boats, with oil companies happily staying behind the scenes (Tillion 2003).

There was plenty of opposition to the extended boundaries. Some members of Congress were concerned about the implications of the move, thinking that extended boundaries would impede commerce and restrict national defense by limiting the Navy's navigation through strategic coastal areas. Even the U.S. Air Force opposed the Act, worried that the 200-mile limit might be applied to airspace in the future. For some members of the State Department, fishing was thought of as a bargaining chip with other countries instead of as a U.S. asset. Another State Department concern was that the United States' unilateral action would anger the Soviets and slow the already long-delayed international Law of the Sea negotiations, begun in 1958. Under the third round of the Law of the Sea negotiations, in 1973, there was substantial support for adopting 200-mile limits through the international forums. There were even some in Alaska's Congressional Delegation who opposed Congressional action outside the negotiations, making passage of Senator Magnuson and Stevens' bill difficult (Hornnes 2006; King 2009; Tillion 2003).

In the end, Magnuson and Stevens were able to persuade Congress to pass the legislation. The Fishery Conservation and Management Act (FCMA) passed on April 13, 1976 with two primary functions. First, it created a new standard of conservation and management within the 200-mile fishery conservation zone (FCZ). Stevens said to the Senate:

> The concept is 'Shall the living resources of the sea have a chance to survive?' The major fishery within our shores is, in fact, the Alaska pollock, where the [foreign fleets] have taken 2.3 billion pounds in one year. That pollock is the basic food chain for the Bering Sea and North Pacific and if this [over-fishing] continues even another [two or three years], it will go the way of the California herring. It will disappear from the ocean. (King 2009)

The FCMA established protection for marine fisheries and provided the framework to manage them (NMFS 2002; King 2009). The second goal was moving towards the "Americanization" of the marine fisheries. In a report to congress, Niblock (1977) states that "one of the purposes of the MFCMA of 1976 is to encourage the revitalization of the U.S. fishing industry." The MFCMA formally recognized the importance and value of the resources off the U.S. coast, and established presence for domestic fishermen to utilize the supply. "Foreign fishing off our coasts cannot be allowed to continue," President Gerald Ford said as he signed the bill (King 2009).

The 200-mile FCZ, later renamed the Exclusive Economic Zone (EEZ) covers almost the entire productive area off the U.S continental shelf in the Eastern Bering Sea (Hornnes 2006; Wolff and Hauge 2008). The law gave the United States the right to regulate all natural resources, such as fishing, oil, and minerals, for a distance of 200 miles off the coast. After the Act's implementation on 1 March 1977, foreign fishing could only be conducted with an international treaty or a governing international fishery agreement (NMFS 2002).

Agreements were reached with Taiwan and the U.S.S.R. in 1976 and with Japan, Korea and Poland in 1977. While the agreements allowed these countries to continue fishing in U.S. waters, they were forced to conform to the Preliminary Fishery Management Plans (PMP) that were instituted as a result of the act, and only applied to the foreign fisheries. The PMP which affected the pollock fishery, Trawl Fisheries and Herring Gillnet Fishery of Eastern Bering Sea and Northeast Pacific, was posted in the Federal Register in February, 1977. The initial PMP set restrictions on pollock harvests to control the foreign fleet, but the principals applied were eventually carried over to the Fishery Management Plans (FMPs) that currently govern the pollock fishery and all its participants. The two primary objectives of the original PMPs and FMPs were to establish limits on various marine species harvests, and to limit bycatch of species of interest to the then extant domestic fisheries. For instance, there was concern that foreign fishing vessels, ostensibly fishing for pollock and other groundfish were in fact surreptitiously targeting higher-valued salmon and crab as bycatch, thereby affecting the amount available for domestic fishermen (NMFS 2002).

The PMPs and FMPs were established under the fishery management structure laid out by the FCMA. The Act set up eight regional fishery councils, which together with the National Marine Fisheries Service (NMFS), manage the nation's marine fisheries. The regional councils are responsible for making policy decisions related to fisheries located within their jurisdiction subject to a set of articulated national standards. The fishery councils and NMFS allow for decentralized decision-making and permit the public to have a say in these decisions. These organizations did not want to go back to the system used to govern Alaska fisheries before statehood, when officials in Washington, D.C. were making decisions thousands of miles away. The new system was designed to allow autonomy in each region; decisions were to be made by the fishery's stakeholders. This system's other unique feature is its transparency. The proceedings are public and allow open testimony in front of the Council and its supporting committees (NPFMC 2006). The Science and Statistical Committees (SSC) and the Advisory Panels (AP) support the Councils in decision-making. The AP is made up of fishermen and fishery stakeholders; it is designed to provide the Council with industry perspective. The SSC is a science panel that reviews the proposed policies and sets upper bounds on total allowable catch (TAC) for each managed species and species group. Both the AP and SSC provide feedback and opinions for the Council, who rely heavily on these two panels when making decisions. The Councils also rely on staff and NMFS to research and develop reports on the impacts of potential rule changes before making decisions.

The regional council governing Alaska's fisheries—and thus the pollock fishery—is the North Pacific Fishery Management Council (NPFMC), which is composed of fifteen members: eleven voting and four non-voting. The four non-voting members represent the U.S. Coast Guard, the U.S. Fish and Wildlife Service, the Pacific States Marine Fisheries Commission, and the State Department. These non-voting members provide informal consultation on the implications of potential regulations from the perspective of their agencies. Seven of the 11 voting members are appointed by the Secretary of Commerce based on the recommendations of the governors of Alaska (5) and Washington (2). The governors typically nominate candidates who reflect diverse interests within the fishing industry in their states. Appointments are for a maximum of three consecutive three-year terms. The remaining voting members are the principal state officials with marine-fishery responsibility representing Alaska, Washington, and Oregon, as well as the NMFS Alaska regional director (NMFS 2002).

Once the NPFMC passes a proposed regulation, it is forwarded to the NMFS Alaska Region Office. NMFS is responsible for reviewing proposed regulations for legality, consistency with national standards and compatibility with existing regulations and for developing an implementation plan. If NMFS determines that one or more parts of a regulation are either impossible to implement or would violate the standards set forth in the MSFCMA, the proposed regulation is remanded to the Council, which can make the appropriate changes. Otherwise, it is forwarded to the Secretary of Commerce for final approval before being published in the Federal Registry (NMFS 2002; Hornnes 2006).

Decisions made by the NPFMC and implemented by NMFS must comply with ten (originally seven) national standards set forth in the MSFCMA. These standards provide the groundwork for fishery management in marine waters. One of the most important standards, implicit in FCMA (1976) and subsequent reauthorizations and explicit in MSFCMA (2007), is the requirement that the total allowable catch (TAC), and optimum yield (OY) be set at or below the allowable biological catch (ABC) and overfishing limits (OFL) determined by the SSC. The concepts of ABC and OFL are explicitly incorporated into each FMP. The ABC is the maximum allowable catch for a species that is believed to be sustainable over time. The OFL is the level of catch that, if exceeded during any year, will result in a shutdown of directed fishing for the remainder of that year, while the OYis defined by the MSFCMA as

> … the amount of fish which—(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery. (MSFCMA 2007)

That is, OY is essentially the ABC adjusted downwards to account for stakeholder concerns. The OY involves a balancing of various objectives or criteria. For example, neither maximizing catch nor maximizing economic return would necessarily optimize the fishery. The OY should be the best balance of conservation, economic benefit, equity and flexibility (Niblock 1977). Under the mandate in the MFCMA for conservation, this would also imply that that the OY should never be set at a level above the ABC—since this would be unsustainable.

According to the FCMA, it is important to manage fisheries in a manner that produces "the greatest overall benefit to the Nation." It expounds further in national standard 4:

> Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be
>
> (A) fair and equitable to all such fishermen;
>
> (B) reasonably calculated to promote conservation; and
>
> (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges. (MSFCMA 2007)

Instead, fisheries in the EEZ are to be run in a way that considers the impacts to the nation. So when decisions are made for fisheries off Alaska's coasts, fishermen, communities, and stakeholders based outside of Alaska are considered on par with those based inside Alaska. Once all of these factors have been considered, the TAC (now called the annual catch limit or ACL) is derived from the OY, and is simply the total amount of fish that is allowed to be harvested for a given time period.

In the case of pollock off Alaska, NMFS scientists use complex models and annual survey data to determine the pollock fishery's biomass and to recommend an ABC and OFL for the coming year. The proposed ABC and OFL are reviewed by the Groundfish Plant Teams, NPFMC appointed committees, and then reviewed by the SSC, which serves as a peer-review panel and passes judgment on the methods used to determine stock status and then provides the Council with specific recommendations for ABC and

OFL. After the ABC is approved by the SSC, it is passed for review by the AP and then to the Council. Based, in part, on input from the AP, the Council specifies the TAC. In addition to the general guidelines detailed in the MSFCMA, the Bering Sea and Aleutian Islands groundfish FMP (NPFMC 2009) has established an aggregate annual cap of two mmt of groundfish harvests in the BSAI. The council must factor this into their decision as they determine the TAC for each species covered under the FMP. In addition to setting the TAC, the Council establishes limits for target and incidental catches of each species.

With the fishery management structure in place, policies implementing the MFCMA (1976) goal of "Americanization" of U.S. EEZ fisheries began to be pursued. In 1976, at the time of passage of the FCMA, nearly 1.2 mmt of pollock were taken from the BSAI by foreign fleets, with 76% of that harvested by Japan, 15% by Russia, and the remaining 7% by South Korea. Much of the fish not being harvested by Japan was sold to them, as demand for pollock surimi continued to rise in Japan. By giving domestic fishermen first priority for fish in the MFCMA, policy makers assumed there would be a quick movement towards the development of a domestic fleet to harvest species such as pollock. This was not the case. Indeed, by 1979—three years after the implementation of the act—only 1% of the total volume of BSAI groundfish was harvested by domestic fishermen and there were no significant domestic processing operations. Over the same time, the makeup of foreign harvests shifted somewhat, with the Japanese harvest share increasing to 82%, at the expense of Soviet harvests which decreased to 6%. The Soviets were eventually squeezed out of the U.S. EEZ pollock fishery as the allocation of foreign fishing permits was used to reward Japan and other U.S. allies (Natural Resources Consultants 1981).

Fish & Chips Policy

The initial slow pace of Americanization of BSAI groundfish fisheries has been attributed to subsidies available to the foreign fleets and the lack of similar subsidies for domestic fishermen. While construction of factory trawlers and motherships such as those used by foreign fleets required substantial financial resources, similarly large investments were being made in the construction of vessels for use in the booming king crab fishery. Instead of switching to pollock and other low-value species with unfamiliar international markets, domestic fishermen focused their effort on crab and other high-value fisheries with well-established domestic markets. Trawling, the harvesting method used for pollock and most other groundfish species in the BSAI, was unfamiliar to most domestic fishermen; moreover, their vessels were not equipped to trawl and crab catches were reaching an all-time high (NMFS 2002; NPSC 1990).

To encourage expansion of domestic fisheries in the BSAI and elsewhere throughout the U.S. EEZ, Congress directed NMFS to introduce the "fish and chips" policy. The policy linked future access of foreign nations to U.S. EEZ fisheries to their efforts to assist in the development of the U.S. seafood industry through purchases of fish harvested by U.S.-flagged vessels and through investment in shore-based processing facilities. The Congress and NMFS instituted a variety of programs from the late 1970s through the 1980s to encourage Americanization of the pollock and other EEZ fisheries. One of the first such programs was approval of joint-venture operations: arrangements where U.S.-flagged catcher boats delivered their harvests to foreign processing vessels. In February 1978, NMFS announced a policy that it would only allow these joint ventures if domestic processors had neither the "capacity" nor the "intent" to buy the fish that were to be processed by the foreign processors. This ruling was overturned when NOAA general counsel determined that the Secretary of Commerce did not have authority, under the MFCMA, to deny foreign processors permits for buying U.S.-harvested fish—regardless of whether the United States also had the capacity and intent to utilize the resource (NOAA 1978).

In 1978, Congress overcame this ruling by passing the Processor Preference Amendment (U.S. Public Law 95-354), which prioritized access to EEZ fish resources in three tiers. Highest priority was given to domestic annual processing (DAP), which was reserved for U.S. flagged fishing vessels selling fish to domestic processors. Fishermen and processors who qualified under the DAP provisions could request the amount of fish they could process before the season began, and up to the entire amount of the TAC would be allocated to them. Any remaining amount between the TAC and the DAP would be offered to the next-level priority, Joint Venture Processing (JVP). This level was reserved for U.S. flagged catcher vessels that delivered their catches to foreign-flagged motherships and factory trawlers. Any portion of the TAC remaining after DAP and JVP demands were satisfied was to be made available to foreign catcher boats and catcher/processors as the Total Allowance Level of Foreign Fishing (TALFF).

Before passage of the Processor Preference Amendment the entire pollock TAC qualified as TALFF. In 1978, foreign fleets harvested all the pollock in the BSAI. Japan alone had six pollock motherships, along with 62 pair trawlers, 23 large trawlers and 103 medium trawlers operating in the BSAI to catch 779,049 mt of pollock (NMFS 1983; NMFS 2002). It was Congress's goal to have all fish allocated to the DAP sector. And with this amendment, it was hoped that there would be some domestic development.

The next major "fish and chips" regulation was the American Fisheries Promotion Act (U.S. Public Law 96-561), which Congress passed in 1980. The AFPA codified the "fish and chips" policy by putting into law four new criteria to apportion TALFF allocations. The first considered the degree to which the foreign nation imposed onerous trade barriers against U.S. fishery products; Japan was particularly reprobate in this regard and it was hoped that AFPA would help open Japan's market to U.S. fishermen. The second criterion favorably recognized foreign purchases of fish products from U.S. vessels and processors, reinforcing a shift from TALFF to JVP. The third criterion penalized nations that re-exported processed catches from the U.S. EEZ back into the U.S. market. The fourth criterion favorably recognized foreign investment in the U.S. seafood industry. The AFPA also gave regional fishery management councils authority to phase out TALFF allocations. Although this rule was never used, it further enforced the idea that if foreign countries did not participate in the development of the U.S. fishing industry, their allocation of fish would be tenuous at best (NPSC 1990).

In addition, NMFS implemented a 100% observer coverage requirement for all foreign fishing vessels operating in the U.S. EEZ. Foreign vessels were required to have a

NMFS-approved observer on board their vessels at all times, monitoring the catch and processing of fish. This ensured that foreign fleets were not overharvesting and misreporting catches, and allowed for better monitoring of bycatch. Costs of the observer program were recovered through increased permit fees to all foreign vessels (National Research Council 1999).

The early 1980s also witnessed the first significant dispute between the offshore (factory trawlers, motherships and aligned catcher boats) and the inshore (shore-based processors and aligned catcher boats) sectors. The dispute started in 1982 over whether to create a fishery development zone (FDZ) near Unalaska in which only domestic fishermen could operate (NPFMC 1982a). This was designed to address concerns that factory trawlers were preempting fish in nearshore fishing grounds, adversely affecting fishing vessels delivering to inshore processors. This would have also aided the catcher vessels delivering to Akutan and favored development of the inshore sector (NPSC 1990).

The Regulatory Impact Review (RIR) accompanying the proposed amendment noted that there is

> … ample, though conflicting, testimony about the existence of the gear conflict problem. American fishermen have maintained that there is a significant problem, while foreign fishery interests argue there is no problem. (NPFMC 1983a)

After analyzing the number of foreign factory trawlers, the RIR determined that

> … clearly, given the mobility of these trawlers and their efforts on localized concentrations of pollock (they have been likened to gigantic vacuum cleaners), these represent high densities of foreign trawlers which could effectively preclude domestic interest in utilizing the area. (NPFMC 1983a)

In September 1982, the NPFMC passed the amendment, but it was subsequently overturned by NMFS due to procedural issues. Not wanting to create any problems which could affect their portion of TALFF, foreign fleets voluntarily refrained from trawling in the FDZ area. The FDZ, thereafter, became a *de facto* domestic-fishing area in which foreign factory trawling was precluded (NPSC 1990).

Joint Venture Era

Since there was no domestic processing of pollock during the early "fish and chips" era, and joint ventures received priority over TALFF, their number grew quickly. Fishermen who participated in the JV fishery talk about how JVs were "suggested" by the government, and by "suggestion," it meant that foreign nations would lose their TALFF if they failed to support development of the JV sector. Indeed, in 1980, U.S. officials withheld Japan's share of TALFF until its fleet agreed to purchase more fish from U.S.-flagged catcher boats. To support fishermen and their foreign counterparts, the Alaska Pacific Seafood Industry Coalition (APSIC) was formed in 1983. Founded by a group of U.S. harvesters and processors operating in the North Pacific, it allowed "industry-to-industry" agreements with their Japanese counterparts. In trade for Japanese cooperation in buying U.S.-harvested fish, the (APSIC) delegation supported the full and timely release of allocations to Japan.

"Fish and chips" policies were not the only reason joint ventures flourished; additionally, the misfortunes of another prominent fishery contributed to the rise of the domestic pollock fleet. The Eastern Bering Sea king crab fishery was very lucrative throughout the 1960s and the 1970s, and consequently attracted ever increasing numbers of vessels. Much of this growth was attributable to Seattle-based first-generation Norwegian immigrants, who, by the late 1970s, owned about 50% of the crab fleet. This same group would subsequently play a key role in the Americanization of the at-sea sector in the pollock fishery. The 1980-1981 season marked the peak of the king-crab fishery, with crab fishermen enjoying their best season ever (Tillion 2003; Hornnes 2006; J. Gruver, personal communication).

Crab fishermen returned the following year to greatly reduced catches: the king crab stock had collapsed. As out-of-work crab boats began to line the wharves of Seattle, fishermen began to look for new opportunities. House-forward crabbers had stern ramps and the ability to haul nets onto their decks. Using government-backed loans, these crabbers were able to upgrade their engine horsepower enough to allow their use as "catcher vessels" in the groundfish trawl fisheries where they delivered to inshore processors or participated in joint ventures with motherships and catcher/processors (Tillion 2003; J. Gruver, personal communication).

This period of rapid growth for joint ventures was exciting for those involved. Many of the ex-crabbers had no trawling experience and underwent a steep learning curve before becoming proficient. The first issue many vessels faced was the operation of the nets, as they learned to keep the mouth of the net open, at the proper depth, and learned where and how to avoid snags on the ocean floor. Once they had these techniques down, fishermen had to be able to find the fish, and then determine how many fish had entered the net; experience more than any other factor, taught fishermen how long to tow. During the learning process, fishermen traded the risk and expense of hauling in half-empty nets against the risk of overfilling their net and splitting the codend and spilling their catch as they tried to haul the fish onboard. Knowledge spread through the fleet as skilled crew members were hired away from the vessels where they had gained experience; fishing masters aboard foreign processing vessels also served as valuable sources of information for their new partners (J. Gruver, personal communication).

Over time, the catcher vessels were able to take advantage of new developments in technology. Part of the reason they were overfilling their net was they didn't know what was in them, and in spite of the level of experience on the vessel blowing out nets was common. These vessels were greatly assisted by new improvements in nets. Perhaps the greatest improvement was using double twine for the nets. This reduced significantly the number of issues with net tears, allowing boats to take in more fish and worry less. Advancements in sonar proved invaluable as well. "One of the greatest advances was an improved sonar, produced by Simrad, which allowed fishermen to see up and down. This allowed us to see what was going into the nets," said John Gruver, a long-time pollock fisherman. Catcher vessels could now determine the size of their catch, and stop fishing with the assurance that the net was not empty or overfull.

Catcher vessels in the mothership fleet operated no further than a one-hour run from their motherships, and delivered their codends on a regular cycle. With typical crews of four, and with fuel and supplies delivered at-sea, catcher vessels could focus on fishing for nine to eleven months a year and annual earnings were high. The fishery attracted newcomers from far away (NPSC 1990; J. Gruver, personal communication). "We would go out fishing, and we would see new tugboats from Mexico that had just started fishing with no prior experience," said Gruver. The number of groundfish joint venture vessels grew from 7 in 1979 to the peak of 127 in 1987 (Figure 1.2). Harvests of pollock from JV operations jumped from over 58,000 mt to a peak of over 1 mmt in 1987 (Berger et al. 1986; Figure 1.3).

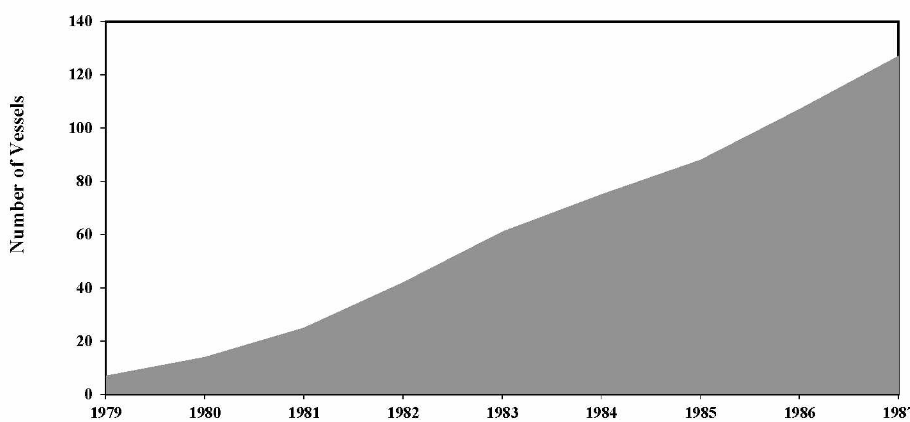

Figure 1.2. Pollock joint venture fishery vessels.
Source: NMFS (2002); NPSC (1990).

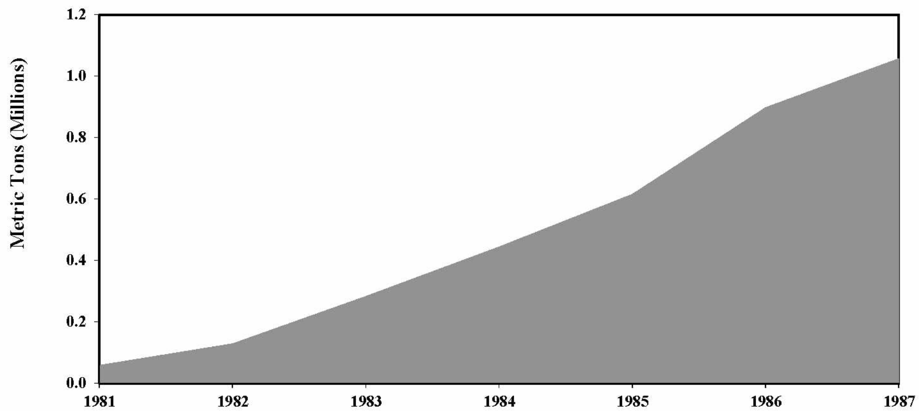

Figure 1.3. Pollock joint venture fishery pollock harvests (mt).
Source: NMFS (2002); NPSC (1990).

A Prototypical Joint Venture

One specific joint venture is described by Kenneth Hilderbrand, Jr., a fisheries observer aboard a foreign mothership that fished 50 to 100 miles offshore between Unalaska and Umiak Island from July 22 to August 19 in 1985. The mothership he worked on was a stern trawler that served as a surimi processor. At 308 feet, it was the smallest of the fleet and could accommodate 35 to 45 ton hauls of pollock and process a maximum of 13 tons per hour. “The ship’s crew of 64 was divided into 2 shifts, working 6 hours on and 6 hours off. All crew worked in the factory, although 16 on each shift were identified as fishing crew.” Crew members were paid $400 and $500 a month and the captain’s wages reached around $3,000 a month (Hilderbrand 1986a).

The mothership was highly productive, since it and the vessels delivering to it didn’t travel outside the fishing grounds during the season. During the four-week period Hilderbrand was aboard, four or five transfers to cargo vessels were made of varying magnitude. Some transfers were simply to take on small quantities of supplies, such as food and fishing gear. Other transfers were extensive, involving offloading surimi, frozen fish, and fishmeal, in addition to taking on supplies. The highest production Hilderbrand observed was about 296 mt of pollock from 300 mt of landings, with the difference being the number of fish discarded. The daily average production for 28 fishing days was 200 mt a day or 8.3 mt per hour. During the 29-day period, the vessel operated at slightly over 61% of maximum production. This led to processing more than 5,600 mt of pollock into 1,200 mt of surimi. In addition, 7.1% of the pollock went to fishmeal and 1.3% to fish oil. Cargo transfers, mechanical problems on catcher boats, lack of fish, and weather kept production below the theoretical maximum (Hilderbrand 1986a; Berger and Hare 1988).

The mothership that Hilderbrand was on was serviced by two catcher vessels; larger motherships in the fleet were supported by three catcher vessels. The two catcher vessels alternated deliveries and the normal schedule left them delivering three and a half hours apart. When it was time to transfer the full net of fish onboard the mothership, seven crew members would leave the factory to handle the cod-end exchange. With seven hours between catcher vessel deliveries, minus the hour for setting and retrieving nets, each boat could tow for as much as six hours. A typical tow length for a full codend of 45 mt was about two hours during good fishing, which meant that the landed fish age was normally four to six hours old. Some tows could be as short as 20 minutes, with only 30 – 45 minutes for set and retrieval. Each catcher vessel had its own unique strategy, but most schools of pollock were found in 60 to 80 fathoms of water and 0 to 20 fathoms off the bottom (Hilderbrand 1986a).

Even with the large amount of fish the catcher vessels caught, the bycatch rate was fairly low, typically less than 0.5 mt per haul. Fishing hard on the bottom often increased bycatch of flatfish—occasionally forcing a move to higher grounds. Any bycatch over 1% caused problems in the factory. The overall discarded rate for all the fish delivered to the mothership was about 0.7%. The low bycatch rate was also attributable to the time of year the vessels were fishing, as July and August are typically months with a low rate of bycatch (Hilderbrand 1986a).

Catcher vessels were fairly lucrative operations. The typical boat was 100 to 125 feet long and operated with a crew of 3 or 4 plus the skipper. With a price of $93/mt, the maximum daily gross earnings were about $14,500 from 155 mt landed. Landings, however, were always less than maximum as discards and small fish reduced the value of the catch. Even with the less than optimal catches, this translated into annual revenues of $1 to $3 million per catcher vessel (Hilderbrand 1986a).

The profit was not without risk: during the 1986 fishing season, the F/V *Sea Dancer* sank with the loss of one life. In addition, mechanical failures, although not common, did occur, with issues such as loss of steering, broken hydraulics on winches, and inoperable fish finders. For example, one boat had a malfunction of the net monitor used to indicate the quantity of fish in the net. Retrieving a net to examine the amount of catch in the net might take an hour away from fishing. But not knowing when the net was full meant the boat might tow far longer than necessary, resulting in wasted fuel and time (Hilderbrand 1986a).

Initial Development in the Domestic Processing Sector of Groundfish

While "fish and chips" policies were successful in promoting joint ventures, there was little progress in the development of a domestic processing sector for pollock. Significant resources were invested into inshore processors in Western Alaska since the 1880s for salmon; however, domestic firms had not made significant investments into either inshore or at-sea processing of pollock. There were several reasons for this. Unlike the joint ventures, where there was an excess supply of vessels from the collapsed crab fishery, there was no surplus stock of factory trawlers looking for new opportunities. Furthermore, investment in a factory trawler or shore-based plant was an order of magnitude more expensive than investing in the retrofit of a catcher boat. Moreover, domestic processors had little to no experience with processing pollock into surimi—the primary product of pollock. An attempt was made in the early 1970s, when Icicle Seafoods Corporation tried an experimental processing plant in Petersburg, Alaska. It was unsuccessful and closed (NPSC 1990).

In 1982, there was a rapid expansion of shore-based processing facilities, with the first focus on groundfish. Trident Seafoods Corporation, Universal Seafoods, Inc., Johansen Sea-Pro, and Jangaard Fisheries began processing groundfish, primarily Pacific cod, from shore-based processing facilities in Unalaska and Akutan. Trident alone processed 40 million pounds of groundfish in its first year, before the plant was destroyed by a fire in the spring of 1983 (NPSC 1990; Hilderbrand 1986a). Pollock was generally not processed at these shore-based facilities, since there was no domestic market for the fillets and domestic processors did not have the technology to produce surimi (Onstot 2008; NPSC 1990). As a result, only 129 mt of pollock was allocated to shore-based processors in 1982 (NPSC 1990).

While domestic shore-based processors were making the first attempts at groundfish processing, there was also an initial effort to develop domestic at-sea processing. Sjong and Konrad Uri, Norwegian Americans who were participating in joint ventures, saw the Japanese and other foreign countries using factory trawlers to harvest fish in the North Pacific.

> I knew that in Norway there were some factory trawlers, and they were the only part of the fishing industry over there that wasn't subsidized by the government, and [I] knew they were making money. If they could do it, why couldn't we? (Sjong 2003)

With financial backing from Erik Breivik, a successful Norwegian factory trawler owner, Sjong and Uri purchased the factory trawler *Seafreeze Atlantic*, for $6 million. The *Seafreeze Atlantic* had fished the Atlantic side of the United States, Greenland, and Norway for two years after its construction in 1968. It was not very successful, so in 1971, it was laid up on the East Coast. It was, at the time, the largest U.S.-flagged fishing vessel. The renamed *Arctic Trawler* left Seattle on 14 May 1980 with Breivik acting as the "fishing skipper," since American rules did not allow a non-U.S. citizen to formally captain a U.S. vessel. The trawl bosun was Kjell Røkke, who would later found American Seafoods. The *Arctic Trawler* had little initial success. "[We] didn't catch anything for two months. It was sad and sadder. We were gone two months, and we found a tremendous amount of fish" (Uri 2003).They had stumbled on dense quantities of Pacific cod and brought home two million pounds of boneless, skinless fillets in little over a month.

The Uri and Sjong sold the *Arctic Trawler* in 1987 due to two primary issues. The first problem was that they were targeting cod, but they were primarily catching pollock. The smaller pollock was difficult to process into fillets and even more challenging to sell (Hornnes 2006). The second problem was that there was a limited domestic market for U.S.-produced whitefish fillets: the *Arctic Trawler* was producing fillets from the cod, and there were few buyers. “The marketplace wasn’t there,” says Sjong. “People were not used to buying their fish this way. It wasn’t best to be number one” (Sjong 2003). In addition, the American consumer was skeptical because of the traditionally bad quality of U.S.-white-fish products. To top it off, the market was flooded with subsidized exports from Canada, leaving little room for new product (Hornnes 2006).

The difficulties facing at-sea processors were no different than those faced by shore-based processors. Although the shore-based processors plants had ventured into the production of groundfish fillets, they too had difficulty selling their product. Chuck Bundrant of Trident Seafoods had produced 40 million pounds of salted cod in from 1982 to 1983, but had no one to sell it to. He tried exporting the product to European markets, but he couldn’t find any takers. According to corporate lore, Bundrant traveled around Europe and was turned down by buyer after buyer. He had reached the end of the road, and with one more stop on his trip, he made a deal with God that if he was able to sell the cod, he would repay him in the future. At the next stop, Bundrant was able to sell the entire load of cod and save the plant. As the story goes, he repaid God by building a large church in the town of Akutan, where the plant is located. Nevertheless, even after that sale, records indicate that Trident’s cod production was a money loser (Hilderbrand 1986b).

Since domestic processors were having difficulty marketing cod fillets, it seemed even less likely that they would be successful with the smaller, more abundant pollock. Furthermore, while domestic processors knew how to fillet fish, they lacked familiarity with pollock surimi production. Without the technology to produce surimi, U.S. processors were unable to gain access to the growing Japanese surimi market. The Japanese, not wanting competition from U.S. at-sea or shore-based processors, remained protective of the surimi production technology (Hornnes 2006). There were also questions as to whether or not pollock could be processed inshore and yield top-quality surimi. Fresh fish is essential to surimi production, and it was unclear whether surimi produced from fish held onboard for up to 48 hours could compete with surimi produced at-sea (NPSC 1990).

Domestic Inshore Pollock Production

Initial attempts at processing cod may not have proven very successful, but they were important because they set the stage for what was to come. Pollock, which was much more abundant than cod, seemed to hold the most potential for future production—if a market could be found for the fillets or if the secrets of surimi production could be discovered. And the tide began to change as the U.S. markets became more receptive to seafood, including whitefish, during the mid-1980s. From 1982 to 1987, the U.S. consumption of seafood increased by 22%, leading to an increased demand for whitefish products—particularly Atlantic cod fillets. Through 1984, the supply of Atlantic cod kept up with the strong demand through rising imports and increased domestic catch. But over time, imports declined and domestic production failed to keep up with the consumer demand. Buyers were forced to look for substitute whitefish products, and pollock began to gain acceptability (Hornnes 2006).

At same time, the demand for surimi was also strengthening (Hornnes 2006). In 1984, the Alaska Fisheries Development Foundation began to experiment with the production of surimi at the Alaska Pacific Seafoods plant on Kodiak Island. Nearly $4 million was spent on the "Alaska Pollock Surimi Industry Development Project" between 1982 and 1987. The project focused on two goals. First, to develop the capability to produce surimi for domestic processors, and in particular, the inshore sector and second, to increase U.S. demand for the surimi products, giving the processors a market to sell to (Holmes 1987; NPSC 1990).

In addition to marketing and research from the U.S. industry, U.S. processors were aided by further "fish and chips" policies. With domestic processing capacity of pollock nonexistent through the early 1980s, increased pressure was placed on Japan in the mid-1980s to invest in the U.S processing industry. The MFCMA was further modified through the 1984 amendments to emphasize to the Secretary of State that allocations of TALFF should be based on a nation's purchase of fishery products. It further clarified that the United States did not have to allocate its surplus fishery resources to foreign nations. After the passage of the 1984 amendments, industry-to-industry negotiations led to the Japanese fishing industry agreeing with their APSIC counterparts in December 1984 to purchase 35,000 mt of processed fish from U.S. processors. This turned out to be a problem for Japan. Because no U.S. operators produced surimi and because there was little demand for pollock fillets in the Japanese market, the Japanese failed to meet their purchase commitment. Intense criticism from the U.S. industry and pressure to hold-up Japan's TALFF allocation led two Japanese companies to invest in inshore surimi processing. The first plant built was the UniSea processing plant in Unalaska, by parent company Nippon Suisan Kaisha, Ltd. The second plant was built as a partnership between Alec Brindle of Wards Cove Packing Company and Taiyo Fisheries and Marubeni, to form a joint venture to build a processor for crab. The result was the formation of Alyeska Seafoods Corporation, which built a plant in Unalaska to process seafood 270-300 days a year and began processing in 1984 (A. Brindle, personal communication). Under continued pressure from the United States the UniSea plant began producing surimi during 1985, and the Alyeska plant began producing surimi in 1986. With this foreign investment into the U.S. seafood industry, the Japanese expected support for full and timely releases of Japanese allocations of TALFF (NPSC 1990).

At the same time, Trident Seafoods was beginning a plant expansion that would allow them to be the first truly domestic inshore operation willing to take a chance on pollock fillets. Bundrant, with the help of Kaare Ness, started Trident from the ground up. Bundrant got his start in 1961, taking a trip to Alaska for the summer to make some money to pay for college in Tennessee. He never returned. Alaska-fishing-industry lore has it that he spent that first summer sleeping under a boat on the docks in Bristol Bay, taking any work he could get on the boats and in seafood processing facilities. Bundrant did well for himself, and after a few years, found himself looking for new ways to make money in the waters of Alaska. He partnered with Ness and bought a crabbing vessel that they paid off after only three months of fishing (Onstot 2008).

Bundrant continued to look for the most profitable fishing methods. Most crab fishermen caught the crab then delivered their catch to processors who processed and sold the product. Bundrant wanted to eliminate the middleman by freezing the crab at-sea and selling the crab directly to the seafood wholesalers. He pooled his money with other fishermen—including Ness—to buy the *Billikin*, a 135-foot vessel. With the model of harvesting crab *and* processing at sea, the company Trident was formed. This model paid off handsomely two years later when crab vessels went on strike over the low exvessel prices offered by crab processors. Bundrant was able to catch and process his crab before selling it to the wholesalers, and with no one else harvesting, he made a fortune that allowed him to continue to expand his fleet (Onstot 2008).

Looking to take advantage of the vast groundfish resources, Bundrant wanted to build a processing plant for crab and cod that his fleet of vessels could deliver to. The Trident plant was built at Akutan, in between Unalaska and Unimak Pass, next to a village of only 60 people. It was an ideal location, next to a deep, sheltered harbor with no distractions for plant employees. More importantly, it was only a six hour boat ride from Unalaska and in close proximity to a very productive fishing ground, the Slime Banks. Cod production began in June of 1982 and continued until a fire burned the processor down in the June of 1983. The Akutan plant was rebuilt in 1984, but with the crash in the crab fishery, production continued with an emphasis on cod-fillet production (Hilderbrand 1986b).

Advances in filleting machines, as well as an abundance of pollock, allowed Trident to move towards production of pollock fillets. The Baader 182 filleting machine—new, less labor-intensive technology—deboned most of the smaller pollock without high-cost human labor. In addition, pollock was much more abundant in the Bering Sea than

Pacific cod. With this in mind, studies indicated that switching to processing pollock instead of cod could be extremely profitable. Trident estimated a switch from focusing on production of cod to pollock would change a net loss into an estimated profit of nearly 35% (Hilderbrand 1986b).

Bundrant still needed to find a market for the fillets. Although cod imports and production wasn't keeping up with the increased U.S. seafood demand, pollock had still not gained widespread acceptance. But Bundrant was a gambler. He had taken a chance on cod and found buyers when it didn't seem possible. Taking a chance on pollock seemed like the next step. Joe Plesha, who is currently legal counsel for Trident Seafoods, remembers a meeting he attended with Japanese fishing interests and Alaska senator Frank Murkowski in 1983. As a Murkowski staff member, Plesha was surprised to learn that Japan was pulling out 2 billion pounds of pollock off Alaska's shores annually. He asked why Americans weren't interested. "It's a trash fish," they responded. American boats didn't have the ability to trawl for pollock. And even if they did, they lacked the capacity to produce blocks of minced fish or surimi. The only American trying to participate in the pollock industry, the Japanese told Plesha, was Bundrant, but he won't be successful. "That's the first thing I heard about Chuck," says Plesha, "He'll never make it."

Bundrant made the move for Trident to switch their equipment to process pollock, with necessary additions to the Akutan plant completed in the fall of 1985. Bundrant still had to find a market for the "trash fish." A potentially huge profit was nothing if there was no one to buy the fillets. His major break came when he was able to talk Long John Silver's executives into visiting the Akutan plant to try and get pollock fillets put on their menu. David Abbasian, the current Akutan plant manager, cooked up some frozen pollock for dinner. The executives, thinking the product was fresh, didn't believe the product was frozen and asked to see it where it came from. With the executives impressed, Long John Silver signed a multimillion-dollar contract for Trident to provide breaded, frozen pollock fillets to the chain. "That was the first big, big major contract to introduce pollock to the U.S. market," Abbasian says. Other fast-food chains, such as

McDonalds and Burger King, soon switched from Atlantic cod to the cheaper, more abundant pollock. Trident was responsible for creating a market for the pollock fillet, creating new opportunities for domestic processing of pollock (Onstot 2008; D. Abbasian, personal communication).

Domestic At-Sea Production

With Trident's success in the U.S. fillet market and Japanese investment into Alyeska and UniSea for surimi production, the inshore sector was making large increases in capacity. At the same time, investment was beginning in the domestic at-sea sector. Although the *Arctic Trawler's* venture into the Pacific cod fishery was not financially successful, investors saw the potential of factory trawlers in the pollock fishery. The Maritime Technical Consultants Corporation (MTC), which was behind the *Arctic Trawler* and several other vessels attempting to harvest cod, was also behind the first attempt to develop domestic factory trawlers for pollock. MTC originally intended to design vessels and have them financed and built them in the United States. They put together a group of investors, many of whom included persons involved in the *Arctic Trawler*. The group included Breivik, who had sold out of the *Arctic Trawler* two and a half years after he had become involved in its operation, as well as John Boggs and Rick Hastings, two other investors who had helped provide equity in the *Arctic Trawler*. Those five, along with other Norwegian and Norwegian-American crab fishermen, raised five million dollars in equity towards building a new vessel to fish for pollock (Hornnes 2006).

Finding the remaining $7 million needed to build the factory trawler was difficult. U.S. banks had been burned by the crash of the crab fishery, and were reluctant to provide vessel construction loans. "I think I talked to all bank directors and vice presidents from California to Seattle", Lars Aage Eldøy, a shipbuilder and one of the founders of MTC recalls. "They always needed more documentation about the fishery, prices, budget and so on." The problem wasn't solved until Eldøy, on vacation, met the director of the local Sunnmørsbanken in Alesund, Norway; one meeting later Eldøy was informed that the $7 million loan had been granted (Hornnes 2006).

The factory trawler *Northern Glacier* was built from scratch at J.M. Martinac Shipyard in Washington in 1983. Although originally fitted to process cod, the sheer amount of pollock in the Bering Sea led Breivik to invest in a new Baader processor designed for filleting pollock. Unfortunately, the machine was designed for processing small pollock taken in the Russian fishery and had problems filleting the larger pollock caught off Alaska. Breivik recalls that he and a Baader technician decided to split the head-section of the processing machine in two. "He split the processor, and it was successful immediately. That triggered the run for pollock over here." The *Northern Glacier* became the pioneer in the production of "frozen-at-sea pollock" fillets, and their success triggered significant investment into the domestic at-sea processing sector (Hornnes 2006).

The *Northern Glacier* was the first U.S. at-sea processor focused on pollock, but more quickly followed. The next to invest was Røkke, another participant in the *Arctic Trawler*. According to Sjong, Røkke had made a name for himself while working on the *Arctic Trawler*: Sjong recounted a time where the net split and Røkke ran onto the net, pulled out a needle, and saved the catch. "He was a 100 feet off the back of the boat, sitting on a bag of codfish, and he saved the load" (Sjong 2003). Coming over from Norway with nothing, Røkke saw potential in the enormous pollock resource. He managed to buy a small trawler and establish his own company in 1982 after spending 2.5 years working on the *Arctic Trawler*. Røkke and Bob Breskovich, the owner of a shipyard, became partners and started investing in vessels together. With a few trawlers in operation, they decided to purchase a vessel from which they were able to process pollock. According to friends of Røkke, he had a way with bank officials (J. Jacobs, personal communication). After negotiations with a London-based bank, the partners bought a processing vessel for $3.5 million. The vessel was financed by British and Indian capital, and Breskovich and Røkke were able to acquire the vessel 99.9% on credit (Hornnes 2006). They renamed her *Golden Alaska* and used her as a mothership for the other trawlers in the company, joining the fishery in 1985 (NMFS 2002). After only a year, the company started making money (Hornnes 2006).

The introduction of the *Northern Glacier* and *Golden Alaska* signaled future opportunities in the domestic at-sea processing sector. Most of the pollock was still processed through foreign joint ventures, and there was significant room in the pollock fishery for additional domestic processing vessels. Since U.S. banks were not willing to provide the significant amount of capital needed for the construction of factory trawlers, those looking to expand operations had to turn elsewhere for investment capital. The principal investors in the *Northern Glacier* and *Golden Alaska* were primarily Norwegian Americans, so it was natural for them to turn to Norway, where banks and financiers were familiar with the operations of factory trawlers. Furthermore, since additional investment capital was to come from Norway, the financiers preferred that the construction of these vessels take place in Norwegian shipyards, where they had significant experience converting vessels into factory trawlers (Hornnes 2006).

Before further vessels were introduced to the pollock fishery, there was some concern as to the legality of foreign investment and construction of U.S. fishing vessels. The United States requires that vessels pursuing commercial activities in U.S. waters have a U.S. certificate of documentation, which includes endorsements to pursue specific commercial activities. Four kinds of endorsements are available under U.S. maritime law, two of which were relevant to the Norwegians and the pollock fishery in Alaska. The first is a coastwise endorsement, which is required for vessels engaged in trade between U.S. ports. To obtain a coastwise endorsement, a vessel has to comply with strict construction, rebuilding and ownership standards defined in statutes in the Jones Act of 1920. The coastwise endorsement in the Jones Act also requires 75% U.S. ownership in the vessel. If a coastwise vessel was substantially rebuilt abroad, it would lose its coastwise privileges. The second type of endorsement is the fishery endorsement, which is required for U.S. vessels fishing in all navigable waters of the U.S. and the EEZ. Compared to the coastwise endorsement, the fishery endorsement was subject to more lenient rebuilding and ownership standards. At the time, a fishing endorsement required that the vessel be owned by a U.S. citizen or a U.S- registered company; however, it did not require U.S. ownership of the stock of the company. It also allowed a greater amount of rebuilding abroad (NMFS 2002; Hornnes 2006).

Until 1980, U.S. fishing vessels were required to have both coastwise and fishery endorsements. In 1980, it was determined that as long as a fishing vessel only operated in the EEZ, it did not need a coastwise endorsement. Since the fishery endorsement did not require that stock be owned by U.S. citizens, this allowed substantial investment from Norway. The only requirement was that officers and directors, as well as a majority of the board of directors be U.S. citizens. That is, all the stock could be owned by foreigners; the investors merely had to set up a "shell-corporation" in the United States. According to Eldøy of MTC, the woman they employed as director at their office also was head of the board of directors in one of the companies they had established to own the vessels; in addition, he had a cousin who held a similar position. Although much of the investment in the at-sea sector came from U.S. fishermen such as Uri, Sjong, Pereyra, and Ness, there was still substantial foreign investment into the factory trawlers that were being converted. This allowed foreign nationals like Røkke to participate in the "Americanization" of U.S. EEZ fisheries, including the BSAI pollock fishery (Hornnes 2006; B. Myhre, personal communication).

In addition, not having to obtain a coastwise endorsement meant that fishing vessels could be rebuilt abroad, return to the U.S. and regain U.S. documentation with full U.S. fishing privileges. Norwegian investors had hired the Washington, D.C.-based attorney Bill Myhre to provide legal assistance to make sure that their vessels met the 1980 U.S. requirements. In 1986, Myhre was again hired to investigate whether it was possible for Norwegian investors to buy U.S. vessels, bring them to Norway for conversions into factory trawlers, and then send them back to the United States and fish in the U.S. EEZ. Through consultation with the USCG and authorities, the conversion of U.S. vessels in Norway to factory trawlers was deemed legal under then current law (Hornnes 2006; Bill Myhre, personal communication).

This set off a flood of vessel conversions headed for the pollock fishery; twenty at-sea processing vessels were converted in Norway for the pollock fishery between 1986 and 1990. The initial conversions were performed in close cooperation with U.S authorities. The first vessel brought over to Norway for conversion on 3 September 1985 was the *Seafreeze Pacific*, the *Arctic Trawler's* sister ship. After the conversion, it was renamed the *Royal Sea*. Sjong and Uri, the original owners of the *Arctic Trawler*, were the primary investors. Four more vessels were quickly found for conversion, and included a former tuna vessel and three oil rig support vessels. The tuna vessel conversion was financed by Uri, Sjong, and Ness of Trident Seafoods; it was named the *Snow King*. The same three investors, aided by Pereyra's Profish International, paid for the conversion of the three oil rig support vessels, which were renamed the *Royal King*, the *Royal Prince* and the *Royal Princess*. Each of these conversions cost $8 to $14.6 million (Hornnes 2006; B. Myhre, personal communication).

Eleven more vessels were converted with Norwegian equity between 1986 and 1990. Breivik, who had taken part in the investment of the *Northern Glacier*, converted a supply vessel into a combined surimi and fillet factory trawler called the *Pacific Glacier* for his company Glacier Fish. Emerald Seafoods, a company backed by Norwegian investment partnered with Korean financiers to refit three factory trawlers, the *Claymore Sea*, the *Heather Sea*, and the *Saga Sea*, looking to gain access to surimi products in two of the vessels. After selling his ownership in the mothership *Golden Alaska*, Røkke financed three factory trawlers between 1988 and 1990, the *American Dynasty*, the *American Empress*, and the *American Triumph*. Røkke took his conversions farther than most companies, stripping down most of the old vessel and completing nearly all the work in Norway (Hornnes 2006). A list of these vessels, their principal investors, and their place of conversion is included in Table 1.1.

Table 1.1. Vessels introduced into the pollock fishery (Hornnes 2006).

Main Investors	**Vessel Name**	**Shipyard**	**Delivery Date**
Sjong, Uri, and Various Partners, Including Ness	Royal Sea	Batbygg	31 – May – 86
	Snow King		14 – Aug – 87
	Royal Prince		19 – Dec – 87
	Royal King		28 – Apr – 88
	Royal Princess		28 – Apr – 88
Breivik & Co.	Pacific Glacier	Mjellem & Karlsen	01 – Jun – 88
Saekvik & Co.	Crystal Viking	Ulstein	15 – Jul – 88
	Crystal Clipper		01 – Nov – 88
Saetremyr & Ervik	Claymore Sea	Soviknes	01- Aug – 88
	Heather Saga	Kvaerner – Kleven	01 – Mar – 89
	Saga Sea	Soviknes	01 – Jun – 90
Røkke, Mogster, & Togersen	American Empress	Aukra	20 – Dec – 88
	American Dynasty	Ulstein	01 – Jul – 89
	American Triumph	Langsten	21 – May – 90
Morgan, Nicolov, & Japanese Partners	Northern Eagle	Ulstein	01 – Mar – 88
	Northern Hawk		01 – Jun – 88
Remoy	Orion	Myklebust	08 – Nov – 88
Huse / Sporesem	Ocean Rover	Langsten	09 – Dec – 89
Jeff Hendricks	Alaska Ocean	Ulstein	01 – Jun – 88
North American Partnership	Ocean Phoenix	Batbygg	01 – Jan – 89

The flurry in building Norwegian converted vessels was not limited to foreign investors. A total of four vessels, three factory trawlers and a mothership, were contracted to be rebuilt in Norway by American interests. Pereyra, through Profish International, and a group of Norwegian Americans invested in the *Ocean Phoenix*—which became the largest fishing vessel in the United States. It was a mothership used for processing fish for the catcher vessels of its owners. In addition, Oceantrawl, Inc., which was headed by Bob Morgan, invested in three foreign converted factory trawlers, the *Northern Eagle* and *Northern Hawk* converted in Norway and the *Northern Jaeger* converted in Germany. Morgan, a former director of the Pacific Seafood Processors Association, a trade association protecting the interests of several shore-based processors in Alaska, was described as "the chief standard bearer for U.S. processors in the Americanization effort." When confronted about his decision to involve a Norwegian shipyard and a Norwegian bank in converting factory trawlers, he responded:

> Capital has no nationality. You have to differentiate between capital sources and control. If you're an entrepreneur, you get capital where it's available. (Hornnes 2006)

While a majority of factory trawler rebuilds took place in Norway, some rebuilds and conversions also took place in the United States. In 1987, Pereyra, through Profish International, financed construction of the *Arctic Storm*, the first vessel rebuilt in the United States—although according to some reports, some of the work was done in Korea (Hornnes 2006; NPSC 1990). In addition, Arctic Alaska Fisheries converted several vessels into factory trawlers in U.S. shipyards, including the *Kodiak Enterprise, Island Enterprise*, *Seattle Enterprise*, *American Enterprise*, and *U.S. Enterprise.*

Much of the investment in factory trawlers was fueled by rising domestic demand for pollock fillets. Bundrant had opened the U.S. market for pollock fillets, and during 1986 and 1987, the prices for pollock fillets increased rapidly as demand grew. This attracted new participants and additional investment from current pollock fishermen, who were also aided by advances in technology. Improvements in fillet technology allowed for greater recovery and more automation, and at the same time, there was increased availability of surimi-processing capability. Surimi-processing technology, which had at one time been limited to foreign processors, was publically available. As a result, factory trawlers now had the option of focusing on fillets or surimi, or a combination of both, which allowed for a more profitable product blend. The combination of factors increased the profitability of the pollock fishermen, creating a rush of investment into the sector (Hornnes 2006).

There are several reasons why much of the investment in rebuilt factory trawler was completed in Norway and sponsored by Norwegian investors. The first is that the process for converting the vessels in Norway was easy for investors. To build the factory trawlers, the "ideal" vessel was first identified. The "ideal" was a U.S.-built vessel that had operated outside the U.S. for more than two years, allowing it to avoid duties on all the equipment placed on board. The MTC would then purchase the vessels and find suitable investors. Financing for loans generally came from Norwegian banks, and the vessels would be converted in Norwegian shipyards. It became a bundled process, where potential suitors would be approached, and once agreed on, most of the subsequent paperwork became a formality. Geir Ole Setremyr, co-owner of Emerald Seafoods, remarked that they were introduced to the package solution: "We were inquired about whether we were interested. The initiative came from Kâre Eikrem [shipbroker at Alesund Shipping]." (Hornnes 2006)

Second, Norwegian shipyards were more experienced and more efficient at ship rebuilding than their U.S. counterparts. Furthermore, Norwegian investors knew the shipbuilders in Norway, and their experience with factory trawlers. Frode Igland, from the Den Norske Bank remarked,

> I don't think that Norwegian investors would have had their vessels converted in U.S. shipyards. They prefer the Norwegian design and equipment. The United States had no experience in building factory trawlers. (Hornnes 2006)

With the increased experience came greater efficiency and decreased costs. U.S.-built vessels and shipyards were more expensive, partly because they didn't have to worry about competition from shipyards outside the country. The U.S. General Accounting Office pointed out in 1976 that U.S. fishing vessels cost up to 30% more than foreign-built vessels because U.S. fishermen did not have the option to purchase vessels from foreign shipyards (GAO 1976). With the increased experience, familiarity, and lower costs, Norwegian shipyards became the destination of choice for vessel conversions (Hornnes 2006).

Not only were Norwegian shipyards more efficient, but U.S. investors benefited from favorable currency exchange rates. The Norwegian krone (NOK) was at a low to the U.S. dollar in the mid-1980s, making it fairly cheap for U.S. investors to spend U.S dollars in the foreign shipyards. For instance, in March 1985, the dollar cost a record NOK 9.48. Sjong estimated that he was able to freeze the loan for the *Royal Sea* at close to that rate, which meant a cost of under $8 million. At that price, “It was a very cheap boat,” especially when it is compared to the over $30 million that Røkke would spend on some of his vessels only two years later. For the Norwegian investors, it was not a problem that the exchange rate was in their disfavor, since they were investing their currency in their shipyards. As the dollar dropped steadily in the later part of the 1980s, this advantage declined (Hornnes 2006).

Lastly, and perhaps most importantly, Norway provided for both the availability of capital and subsidization of financing through Norwegian banks and government. This was needed, as even with the high level of equity raised for some of the conversions, the U.S. banks were not willing to take a chance on the risky fishery sector. In Norway, however, it was a different story. Norwegian banks were familiar with the business of factory trawlers and were happy to offer the loans. The three largest business banks in Norway, Norske Creditbank, Christiania Bank og Kreditkasse, and Bergen Bank, increased their capital holdings by 150% between 1983 and 1987 by financing factory trawler conversions. Competition was so fierce that the banks even built branch offices in Seattle to compete for business from the primarily Seattle-based fishermen (Hornnes 2006).

The Norwegian banks were also assisted in part by the subsidization of interest rates from the Norwegian government. Subsidization of shipbuilding projects dates back to Japan in 1947 and resulted in all major ship-building countries offering subsidies by the 1960s in order to remain competitive. To understand how these interest subsidies work in the shipbuilding process, it is important to understand the two-step process by which vessel construction is financed. The first step involves the ship owner paying a share up front, perhaps 20% of the price. The shipyard then finances the remaining costs of construction by obtaining a construction credit from a bank. When the ship is completed, the ship owner is able to obtain long-term collateralized loans to pay off the shipyard's construction credit and finance the vessel (Hornnes 2006).

In 1982, Norway introduced a new legislation in order to support its shipbuilding industry. The new arrangement involved interest rate subsidies for shipyards as well as long-term credits to vessel owners, which were available for both domestic and export contracts. The long-term credits and interest-rate subsidy were soon supplemented by a cash-payment arrangement, in which the Norwegian government supplied much of the equity in the transaction to rebuild the vessels. The interest rate subsidy, which was granted to shipyards, was then accepted by banks as equity. According to Pereyra, such subsidies financed 100% of the equity needed for the *Royal King*, *Royal Prince* and the *Royal Princess*, in which his company Profish International had a one-ninth interest (Hornnes 2006).

Anti-Reflagging Act

As the domestic at-sea sector was ramping up their construction of vessels through both domestic and foreign investment, certain U.S.-processing interests realized they were vulnerable to a different threat—the reflagging of ships by foreign countries. Under the Vessel Documentation Act of 1980, regulations allowed foreign-owned companies to reflag their foreign-built vessels as vessels of the United States and then transfer ownership to a U.S. shell corporation. In addition, American entities could purchase foreign flagged vessels and reflag them as U.S. ships. By reflagging their vessels, foreign companies could receive the same priority as U.S. companies for the DAP allocation, thereby circumventing the purpose behind Americanization. Initially, the primary concern was directed at the Japanese, who were involved in joint ventures and could reflag their motherships and provide competition with domestic processors.

The U.S. processing interests expressed their concerns in a letter to several senators and congressmen, including Senator Stevens of Alaska, on 24 September 1986:

> The rapid increases in domestic harvests through joint venture fishing arrangements and domestic processing operations have drastically reduced foreign fishing (TALFF). Consequently, the large foreign fishing fleets which have been operating in the U.S. fishing zone are now faced with the prospect of reduced utilization of these foreign built vessels, many of which are fully amortized. … To counter this growing Americanization threat certain foreign fishing companies are now aggressively pursuing plans to maintain their control and pre-eminence in the fisheries off Alaska by forming majority owned 'U.S. citizen' corporations for the purposes of acquiring U.S. flag harvesting vessels and/or reflagging their existing factory vessels as U.S. processing vessels. Several foreign fishing companies have taken such action. We expect others to follow suit in the near future. (Committee on Merchant Marine and Fisheries 1986)

The letter calls for regulations "that a foreign built vessel cannot be documented as a 'vessel of the United States' for purposes of processing U.S. harvested fish" in the EEZ as well as regulations that "require that any U.S. documented vessel engaged in harvesting or processing fish" in the EEZ "be majority-owned and controlled by U.S. citizens" (Committee on Merchant Marine and Fisheries 1986).

The letter was signed by several industry groups. Trident Seafoods, the only majority owned U.S. shore-based processor that had ventured into processing pollock, signed the letter, as the reflagging of foreign vessels could hurt their share of the allocation. In addition, other groups representing U.S. catcher vessels, longliners, and other fishermen signed the letter in opposition to the reflagging loophole. The letter was also signed by the Alaska Factory Trawler Association (AFTA), which represented domestic factory trawlers in Alaska. At the time of the letter, there was only one factory trawler that had entered the pollock fishery which had been converted in Norway, and it was owned by American citizens, Uri and Sjong. The last group to sign the letter was composed of representatives of the domestic shipbuilding industry. Their concern was that the reflagging loophole could reduce demand for U.S.-built vessels (Committee on Merchant Marine and Fisheries 1986; Hornnes 2006; NPSC 1990).

To address these concerns, H.R. 5658 and H.R. 5662 were introduced to the House of Representatives 7 October 1986. H.R. 5665 would have excluded foreign built vessels, while H.R. 5662 would have amended maritime laws to prohibit documentation of foreign built or foreign owned fish processing vessels. Additional bills were introduced over the next eight months, with most of the attention focused on the prevention of re-flagging of vessels. Nevertheless, a majority of the testimony before the Senate Committee on Commerce, Science, and Transportation on 28 April 1987 opposed imposing any citizen ownership requirements on U.S. flag vessels, because many in the industry desired the access to foreign capital. Before the House Merchant Marine and Fisheries Committee the following day, Delmar Smith of the American Waterways Shipyard Conference submitted testimony as to 21 examples of U.S. fishermen and processors who were unable to obtain financing in the United States to construct or convert U.S. fishing industry vessels. The various bills were finally consolidated into one primary piece of legislation as on 4 June 1987: H.R. 2598- the "Anti-Reflagging Act."

Although the letter and original drafts of the Anti-Reflagging Act focused on the reflagging of foreign motherships as U.S. vessels, the important issue of foreign rebuilt vessels emerged shortly thereafter. The initial investment sparked a flurry of concern from competitors that had failed to capitalize on the opportunity. Domestic catcher vessel owners, delivering primarily in joint ventures to foreign motherships, were worried that domestic investment in factory trawlers would eliminate the JVP allocation they relied on. Likewise, Trident and their fellow shore-based processors did not want the additional competition for the DAP allocation.

The shipbuilding unions also become increasingly concerned. As discussed before, Norwegian investors and the shipbuilding industry were starting a flurry of projects in 1986 and 1987 for at-sea processors in the U.S. EEZ, and that meant that U.S. shipbuilders were missing out on millions of dollars of work. Testimony before the American Waterways Shipyard Conference indicated that:

> Within the past few months, several of these conversion jobs have been undertaken by Norwegian shipyards. When we first became aware of this, we were astounded that it could conceivably be cost effective to move these surplus supply vessels from the United States to Norway to do the conversion work. Based on our analysis and information, on an unsubsidized basis, the U.S. shipyards which have traditionally been involved in this work are very competitive with, if not cheaper than, yards who do the same work in Europe, particularly Scandinavia. This is especially true with the devaluation of the U.S. dollar and the strengthening of foreign currencies. In addition, the cost of conversion is increased by the cost of moving the vessels from the United States to shipyards in Europe and back, a cost which on a per vessel basis is estimated to be approximately $150,000.
>
> When we became aware of the fact that we were losing this conversion work to foreign shipyards in Europe, we investigated to determine how it could possibly be. The information we developed indicates to us the shipyards doing this work in Norway are offering significant subsidies, both direct subsidies for reconstruction work and subsidized financing. In fact, we are aware of one circumstance where a vessel owner was approached by representatives of a Norwegian shipyard and offered a significant subsidy to do the work in their shipyard. (NPSC 1990)

Desiring to protect their jobs, shipbuilding unions pushed for additional regulations over and above those originally included in the letter. Shipbuilding interests documented 36 fishing industry vessel projects that had involved substantial foreign shipyard work.

They pressed Congress for additional regulations that would prohibit the rebuilding of any U.S. fishing vessel in foreign shipyards. There was also an additional push from a shipbuilding group that wanted to develop in the North Pacific (NPSC 1990; Myhre 1998). According to Rod Moore, a former member of Congressman Don Young's staff, a group of U.S. investors, which included George Steinbrenner of the Yankees, had offered to create a system of barges and develop a "highway" in the North Pacific for the fishing industry—if favorable conditions were created.

Shipbuilding unions and shipyards became important drivers of new legislation, promoting their desired legislation as the next step of "Americanization" in U.S. fisheries. And as long as there was a "grandfather clause" allowing current projects eligibility to participate in EEZ fisheries, there was little opposition. This was an important provision, for at this point, at least 24 vessels had been granted rulings from the Coast Guard confirming that they would eligible for fisheries endorsements after their foreign rebuilding projects.

It was, in fact, the U.S. government who stood to lose the most from this piece of the legislation. The U.S. had implemented a loan guarantee program in the 1970s to promote the building of off-shore oil supply and delivery vessels. The program guaranteed 87.5% of loans, and with the crash in the price of crude in 1986, the government was left with a glut of vessels. The government found fishermen looking for potential vessels for conversion as the primary buyers of the docked vessels and provisions eliminating foreign rebuilds would reduce the demand for them (B. Myhre, personal communication). In spite of these concerns, the bill was amended on 28 July 1987 to: (1) to prohibit fishing industry vessels rebuilt abroad from fishing in U.S. waters; and (2) require that a controlling interest in corporations be held by U.S. citizens, but it explicitly exempted currently documented vessels.

It was not until 4 August 1987, at the bequest of fishing interests looking to stall the ban on the reflagging of foreign vessels, that Senator Frank Murkowski introduced an amendment to the bill that required U.S. controlling interests in fish processing vessels. It was a measure that benefitted few fishery participants. A majority of the domestic factory trawler fleet was built either through foreign direct investment or financing. Shipbuilders wanted the foreign capital flowing into new projects, as long as it went towards building or rebuilding vessels in the U.S. Catcher vessels delivering to foreign owned processors did not want to lose their foreign buyers. It was believed that by introducing the unfavorable regulation at the last minute, it would squash the bill. The original amendment was designed to run with the owner or corporation, not the vessel itself (B. Myhre, personal communication; Myhre 1998).

Senator Murkowski introduced the amendment to the Senate with the following statement:

> This provision will not remove the privilege of fishing from any person or company that is presently operating or that can demonstrate that it already has undertaken to purchase a vessel for use in the fishery. It simply ensures that future entrants are controlled by the interests of the United States, rather than those of other nations. This amendment is a needed- in my opinion, a mandatory–step in the process of Americanizing our fisheries. Only a few years ago, Americanization seemed like a goal that would never be reached. Then, after our objectives were given form by the Magnuson Act, we began at last to make rapid progress. Our biggest lapse, however, has been to ignore the fact that much of our industry is financially subject to foreign interests. I will be the first to admit that foreign investment has brought some benefits. It has, for example, helped our fishermen learn new techniques, provided access to new markets for some processors who employ U.S. workers, and made it possible for both at-sea and onshore capacity to expand rapidly. But now is the time to say enough! (NPSC 1990)

The proposed ownership requirements encouraged considerable debate, with significant opposition to its inclusion. The Senate amended the bill on 17 December 1987, and with it, the wording which explicitly terminated the grandfather clause if the vessel was sold to another owner. This amendment was combined with the House version of the bill and was passed 22 December 1987. It was almost vetoed by President Ronald Reagan, but was eventually signed as the Commercial Fishing Industry Vessel Anti-Reflagging of 1987 on 11 January 1988 (Myhre 1998).

The final Anti-Reflagging Act contained several important elements. The first was an expanded definition of fishery to include fish processing, storing, and transporting. As a result, fish processors and tenders were required to obtain a fishery endorsement rather than a registry endorsement. Prior to the Act, foreign motherships could process fish with only with a registry endorsement, which allowed 100% foreign ownership (through a U.S. subsidiary corporation). The inception of this clause made it mandatory to obtain a fishery endorsement for all foreign vessels, which made foreign vessels participating in the fishery illegal. This eliminated the eligibility of reflagged vessels in U.S. fisheries (U.S. 101 Stat. 1778 1988; NPSC 1990; NMFS 2002).

To tighten up foreign ownership rules further, the Act also made the qualifications for receiving a fishery endorsement more restrictive. Before the Act, foreign ownership was legal through a U.S. shell corporation, but the new law mandated a U.S. controlling interest of at least 50% of the common stock. In addition, the Act required that all rebuilding, including the construction of major components, be done in U.S. shipyards, eliminating the future use of foreign shipyards. The Act also limited factory vessels from hiring entirely foreign crews. Instead, the Act mandated that 75% of the unlicensed crew on the vessels be U.S. citizens (U.S. 101 Stat. 1778 1988).

Since the Act was signed into law on January 11, 1988, but was enforced retroactively as of July 28, 1987, there was a grandfather clause in the Act to account for investments made by vessel owners under prior laws. If the Act had been enforced without the grandfather clause, the retroactive date would have eliminated numerous vessels in the pipeline or under construction in Norway and other foreign shipyards at the time. Under pressure from U.S. companies with vessels under construction in foreign shipyards, Congress inserted several grandfather clauses into the Anti-Reflagging Act, permitting vessel rebuilds that had embarked on foreign conversions based on the prior law. The first category of clauses eased the prohibition against foreign rebuilt vessels.

Under this clause, a vessel converted outside the United States would still be eligible for fishery endorsement if one of four conditions existed:

1. If before July 28, 1987 the vessel was licensed under registry and operated as a fish processor or tender in the navigable waters of the United States or the Exclusive Economic Zone;
2. If before July 28, 1987 the vessel was purchased by a U.S. citizen or corporation for use as a processor or tender under contract entered into before July 28, 1987;
3. If before July 28, 1987, the vessel was documented as a U.S. flag vessel and was rebuilt in a foreign country before July 28, 1987; and
4. If a U.S. built vessel is subsequently rebuilt in a foreign shipyard providing rebuilding is done under contract entered into before January 11, 1989, and the vessel is delivered before July 28, 1990.

(U.S. 101 Stat. 1778 1988)

These clauses were intended to account for foreign ownership and construction of vessels that began under prior law, as well as for vessels that were in the process or had been purchased for reconstruction in other countries, but were intended for the U.S. EEZ. There was an additional category of grandfather clauses that eased the impact of the citizen control requirements. The clause reads:

> [The citizen control requirement] applies to vessels issued a fishery license after July 28, 1987. However, that [requirement] does not apply if before that date the vessel…
>
> 1. was documented under chapter 121 of title 46 and operating as a fishing, fish processing, or fish tender vessel in the navigable waters of the United States or the Exclusive Economic Zone, or
> 2. was contracted for purchase for use as a fishing, fish tender, or fish processing vessel in the navigable waters of the United States or the

> Exclusive Economic Zone, if the purchase is shown by the contract or similarly reliable evidence acceptable to the Secretary to have been made for the purposes of using the vessel in the fisheries.

(U.S. 101 Stat. 1778 1988)

The intent of these grandfather provisions was to accommodate those foreign-owned factory vessels which were already in the fisheries and instances where foreign-owned entities had already purchased factory vessels for the purpose of operating them in fisheries (NPSC 1990; NMFS 2002).

Effects of the Anti-Reflagging Act

Passage of the Anti-Reflagging Act limited the long-term foreign development of the pollock and other fisheries in the U.S. EEZ. The Act eliminated the rebuilding of factory-trawlers in foreign shipyards not specifically grandfathered, thereby insulating U.S. shipyards from competition. There was also an increase in the percentage of U.S. hires for jobs on processing vessels—although there are still some hires that come over on work visas. Most importantly, perhaps, the Act eliminated the ability of foreign vessels to reflag, which affected Japanese plans to reflag their fleet as U.S. vessels.

Much to the chagrin of advocates for limits on foreign investment, the Anti-Reflagging Act did not stem the flurry of new vessels and foreign capital flowing into EEZ fisheries. Domestic catcher-vessel owners (who now backed the foreign ownership requirement with the elimination of foreign reflagging) and processors had hoped that the bill would eliminate the foreign investment into efficient factory-trawlers. This was not the case. The Act had a limited impact on the foreign control of vessels. First, the controlling ownership rule applied only to corporations, with the United States Coast Guard (USCG) applying the same standards that are applied under the Jones Act. For corporations, the USCG simply requested the nationalities (but not identities) of the CEO or chairman of the board, and a rough indication of the proportion of voting shares owned by U.S. citizens (under 50%, 51 to 74%, or 75% and above). In theory, a foreign individual or entity could own 100% of the non-voting stock and 49% of the voting stock, and still be eligible for a fishery endorsement. The foreign-control law could also be avoided through the use of loans. Many foreign investors acquired a majority interest in fishing vessels through loans secured by a preferred-ships mortgage in accordance with the Ships Mortgage Act. Since preferred-ships mortgages are secured by the vessels themselves, such loans gave foreign investors considerable influence and control over a highly mortgaged vessel. Shipyards and banks in Norway and Japan were reported to have invested hundreds of millions in factory trawler conversions through preferred-ships mortgages. Thus as the regulations were written, the Anti-Reflagging Act did little to restrict foreign control of fishery vessels (Gay 1992; NMFS 2002).

The Anti-Reflagging Act also allowed any vessel that qualified for a fishery endorsement to be bought by either a U.S. or foreign entity and be rebuilt in a foreign country—as long as the contract was entered into before 11 January 1989 and the vessel is delivered before 28 July 1990. Before the Anti-Reflagging Act was passed, Congress was informed that 24 vessels had received favorable rulings from the USCG to proceed with foreign rebuilding projects and documents were circulated to Senate staff indicating that up to 46 foreign rebuilding projects were likely eligible under the grandfather clause. With the impending regulations banning significant foreign rebuilding projects, the vessels that had received a ruling were bought by the highest bidder. And this meant converting the vessels into processing vessels. For example, Sunmar Alaska Inc. had plans to build shipping vessels to supply the American fishing fleets. The company wanted to rebuild three vessels into fishing tenders, and applied for a USCG ruling to proceed with rebuilding outside the U.S. With the passage of the Anti-Flagging Act, Sunmar switched their plans and decided to build processing vessels instead. They sold off the vessels, including the *Alaska Ocean* and *Northern Hawk*, before completion. The Anti-Reflagging Act played a role in the rapid buildup of foreign rebuilt at-sea harvesting capacity in the pollock fishery, with fishermen completing 17 of the 20 at-sea processing vessels converted in Norway between 1988 and 1990, following the signing of the Act, and 23 out of the 24 vessels receiving rulings allowing conversion in foreign shipyards (B. Myhre, personal communication; Hornnes 2006).

Another issue with the Anti-Reflagging Act was the language addressing changes in ownership of the vessels. Under the verbiage in the Act, a vessel was grandfathered under the Act, and as a result, changes in the owners would not affect the status of vessel. An example would be a factory trawler which had been rebuilt in Norway and was 100% owned by Norwegians, but had received a fishery endorsement to fish in the United States under the grandfather clause in the Anti-Reflagging Act. As the Act was written, it could be argued that the grandfather exemption ran with this vessel, so if it was sold to a Japanese company twenty years later, it would still carry its fishery endorsement with it. This point became an area of contention, as there was testimony before Congress indicating that the grandfather clause was only intended to account for current owners who made investments under the prior law. Though this wording was removed in a subsequent amendment, there was a question as to whether the push to pass the bill quickly led to legislation that did not convey the true intent of Congress (NPSC 1990; NMFS 2002).

With the Act's poor wording, the USCG was left to interpret the Act as it was written. The USCG formally adopted the regulations interpreting the ownership-savings clause on 12 December 1990. The regulation stated that a corporation meeting the pre-existing requirements regarding the citizenship of its president but not satisfying the newly enacted 51%–citizen-control requirement may nevertheless be eligible for a fishery endorsement if, prior to 28 July 1987, the vessel came within subsection (1) or (2) of the savings clause. In other words, the savings exemptions was to "run with the vessel" rather than the owner, an interpretation that is consistent with maritime law (B. Myhre, personal communication). The implication of this ruling was great, because any international corporation could now avoid the citizen-control requirements altogether by simply purchasing vessels holding "grandfathered" fishery endorsements (NMFS 2002). A GAO study estimated that approximately 29,000 U.S. vessels were licensed for fishing, and thus grandfathered as of the savings clause cut-off date (GAO 1991).

This didn't sit well with U.S. shipyards and certain fishing companies. U.S. shipyards expected to be protected by the act, because they could not compete with foreign shipyards. Catcher vessels were losing their JVP allocation; their foreign partners were unable to reflag and domestic factory trawlers were taking a larger share of the pollock TAC. Furthermore, Trident and other shore-based processors realized the increased competition from factory trawlers posed a threat to their allocation of fish. The elimination of these factory trawlers would substantially benefit the remaining participants of the pollock fishery as more participants battled over the pollock catch. On 16 May 1990, before the USCG's final ruling regarding grandfather clauses was published, the Southeast Shipyard Association and several U.S.-owned fishing companies challenged the granting of new fishery endorsements to two factory trawlers, the *Resolute* and the *Northern Hero*. Both of these vessels were owned by corporations controlled by U.S. citizens prior to 28 July 1987, and were subsequently sold to corporations in which foreign citizens held controlling interests. Not only were the vessels under foreign ownership, but the plans to build the vessels in Norway were switched, with rebuilding to now be done in Japan, with further modifications to the vessel's design. A court decision was reached on 30 April 1991, when District Court Judge Penn overturned the USCG's interpretation of the ownership savings clause, ruling:

> … the savings clause did not attach to vessels and thus did not permit the transfer of 'grandfathered' vessels to noncitizen-controlled corporations.

The USCG's interpretation, the court stated, would

> … effectively obliterate the primary purposes of the Anti-Reflagging Act

which the court identified as promoting

> … the continued orderly growth, development, and competitiveness of the U.S. fishing and fish processing industry...(NPSC 1990; NMFS 2002)

The District Court's decision caused immediate concern throughout the fishing industry. At least 60% of the North Pacific offshore fishing industry was owned by foreign-controlled corporations. The USCG decided not to appeal the District Court's decision; instead it issued an advance notice of rulemaking to consider new interpretations of the savings-clause exemption. An estimated 28 factory trawlers and 1.1 mmt of processing capacity risked losing their fishing endorsements. Affected companies immediately appealed the decision, and while the cases were in court, the USCG chose not to strip any vessels of their fishery endorsements (NPSC 1990; NMFS 2002).

On 24 November 1992, through the appeals process, Eleventh Circuit Court Judge Randolf reversed the District Court's decision and upheld the USCG's original interpretation of the savings clause running with the vessel. Randolf's opinion was based on the fact that under maritime law, it is the vessel, and not the owner, that is eligible for documentation. Randolf noted that endorsements are issued to vessels rather than owners. Furthermore, Randolf reasoned that the language of the savings clause clearly frames exemptions in terms of the vessel. According to Randolf:

> On its face, the clause makes nothing clear on who holds title to the vessel in the future. The criteria mentioned in the clause relate back, not forward. Whether a ship is grandfathered depends on what documentation had been issued to it before July 28, 1987 … to give the savings clause the meaning the plaintiffs ascribe to it—that a grandfathered vessel will lose its exemptions if it is sold to another corporation after July 28, 1987 would require many additional words to be read into the statute. (979 F.2d 1541)

That is, Randolf overruled the District Court's original ruling because it was not based on the original language of the Anti-flagging Act. The District Court's ruling was made on the basis of a House report that described the legislative intent of the Act. However, the legislative intent could not be inferred since the Act came before the Senate without the House Report relied on by the District Court. The Senate had only the Act to consider in voting. Therefore, the House Report could not be used to imply the intent of the act. Randolf had further issues with what it meant for the change of ownership. For instance, if one share of stock was sold, did that constitute a change in ownership (NPFMC 2002; B. Myhre, personal communication)?

Both the District and the Circuit Court appeared frustrated by the Act's inexact language and incomplete legislative history. Attorneys with the USCG's Office of Documentation and Tonnage consider the Anti-Reflagging Act so poorly crafted that its intent is often incomprehensible—and consequently, nearly impossible to implement. Senator Stevens concluded,

> When we marked up that bill, we just didn't do a good job. We should have closed that door, and we should have been very plain about what a rebuild was. And when we said, 'to the owner', we should have said, 'to the original owner', to the owner who submitted the papers at the time that the exemption was sought; but we didn't. (NPSC 1990; NMFS 2002)

With the Circuit Court's decision in place, the Anti-reflagging Act did little to slow the short-term growth of new processing capacity in EEZ fisheries. Although only 22 of the potential 46 vessel that the writers of the Act knowingly allowed into the fishery were ever given a fishery endorsement, this proved to be more than the pollock fishery could sustain. Instead of slowing down the number of vessels being rebuilt for at-sea processing in the pollock fishery, the number grew exponentially to ensure access to the fishery. Although there was an attempt to lobby Congress to amend the Act, no changes were to be made until nearly eleven years after its passage.

Rise of the Inshore and Offshore Sectors

As the number of rebuilt factory trawlers grew between 1988 and 1990, it became increasingly clear to both shore-based and at-sea processors that the capacity for pollock processing was going to exceed the amount of fish available. TALFF and JV allocations were becoming ever smaller and with additional processing capacity in the pipeline, it evident that TALFF and JV allocations would be eliminated altogether and that soon domestic processors were going to be fighting over the pollock resource. By 1990, nearly 50 factory trawlers were participating in the fishery, and it was not only the at-sea sector that was growing, the inshore sector was undergoing a similar flurry of capital stuffing in processing and harvesting capacity. Trident was expanding its primary focus from pollock fillets, and through a partnership in 1988 with Nissou, had begun construction on a surimi plant (Atkinson 1988). With the political pressure placed on Japanese companies, large investments had been made in the domestic inshore sector with the UniSea, Alyeska, and Peter Pan focusing effort on producing pollock surimi. In addition, Westward Seafoods, another Japanese owned company, was building a plant in Unalaska that would become operational in 1991 for the production of pollock surimi. Although foreign-owned, these processing facilities were on-shore and qualified for the DAP allocations.

With the exception of Trident and Wards Cove, the investment used to build and develop these shore-based processing facilities came from Japanese companies, which at the time included Nippon Suisan, Maruha, Taiyo, Marubeni, and Nichiro. These companies were beginning to feel the pressure from the factory trawlers that were now taking part in the pollock fisheries. Until this point, the Japanese had been the dominate players in the pollock fishery. They were pioneers in the harvest and processing of the pollock resource in the 1960s and 1970s, and maintained more than 80% of the TALFF during the early 1980s. They had responded to U.S. pressure during the 1980s by helping U.S crabbers transition into JV trawlers. These Japanese companies assumed they would be able to reflag their vessels in the late 1980s to qualify for the DAP allocations.

But the Anti-flagging Act had cut off the Japanese's access to pollock:

> The Japanese had never thought, when they had all the joint ventures going through, that they would lose control. They thought that they would use the joint ventures as an interim step, then they would re-flag those boats, and the industry would be theirs. But they got cut off at the path. (Hornnes 2006)

Instead, most of their processing ships, which had been working in joint ventures and had been receiving a portion of the JV processing allocation, were now losing their allocation to the now expanding domestic processing fleet. Joint venture harvests and processing peaked at 1,057,316 mt in 1987 and by 1989 JV harvesting had declined to 277,186 mt, with only 93,415 mt of that going to foreign JVs (NPSC 1990; Hornnes 2006).

It was apparent that within a year or two, the only parts of the Japanese fishing operations that would be eligible for the DAP allocations of pollock were their shore-based processors. But these investments were threatened as well. With the shore-based processors expanding capacity, their portion of the pollock catch had risen from 23,133 mt in 1986 to 242,278 mt in 1989. On the other hand, catches by domestic factory trawlers were rising faster, with growth from 31,080 mt in 1986 to 846,278 mt in 1989. This set the stage for a battle between the primarily Japanese dominated inshore sector and the rapidly expanding Norwegian financed factory trawler fleet (NPSC 1990; Hornnes 2006).

Operation Differences between Sectors

While the at-sea and inshore sectors each have unique strengths, by the early 1990s, it was clear that the at-sea fleet had an operational advantage under the race-for-fish. The domestic at-sea processing sector was composed of two primary fleets: factory trawlers and motherships. Unlike inshore catcher boats, factory trawlers have the advantage of being able to stay on a school of pollock for as long as it is profitable; with more time spent fishing and less spent traveling to and from fishing grounds, the factory trawlers were more efficient at catching fish than the catcher vessels delivering to shore-based processors. Pollock processed at-sea was also viewed more favorably by Japanese consumers. Because factory trawlers and motherships have the ability to process the pollock within hours, these processors typically receive higher prices for their products, especially surimi and roe (Bledsoe et al. 2003). For example, similar grades of roe typically receive a 30% premium if produced at sea.

The primary distinction between motherships and factory trawlers is that motherships depended on fleets of catcher vessels to harvest the fish. In 1990, there were three domestic motherships operating in the Bering Sea pollock fishery, ranging from 305 feet to 688 feet long. Each mothership owned or contracted with a fleet of catcher vessels. The *Golden Alaska* entered the North Pacific fisheries in 1985, the *Ocean Phoenix* entered in 1989, and the *Excellence* entered in 1990. Although motherships had the ability to process large volumes of fish, the mothership sector did not expand as rapidly as the factory trawl sector (NMFS 2002).

The catcher vessels operating in the Bering Sea are relatively homogenous; most have participated in a variety of BSAI fisheries, including pollock, Pacific cod, and crab. Vessels in this sector range from 60 to 193 feet, with most pollock trawlers in the 70 to 130 foot range, with an average horsepower of 1,500, an average gross tonnage of 225 mt, and an average hold capacity of 8,300 cubic feet. The stereotypical catcher vessel is a crabber retrofitted in the early 1980s. Catcher vessels' operating range was largely determined by their hold capacity. Those with little or no storage capacity generally participated in the mothership sector where they could trawl in close proximity to the mothership and transfer laden codends. Catcher vessels with hold capacity and refrigerated sea-water hold cooling systems had the option to deliver to the motherships or shore-based processors. If they chose to deliver to shore-based processors, they would travel anywhere from half a day to up to two days to reach the fish. From the time they make their first tow of fish, they have 24 to 48 hours to transport the fish back to shore, otherwise quality degrades and the fish are only suitable for low-value products such as fishmeal. Consequently, catcher vessels delivering to shore-based processors focus their efforts as close to the plant as possible, typically within a range of 150 miles (NPSC 1990; NMFS 2002).

In 1986, most catcher vessels were involved in joint ventures with foreign motherships. Of the approximate 130 catcher vessels operating in the Bering Sea in 1986, only 10 delivered primarily to the shore-based processors. Although motherships offered lower exvessel prices, operating costs were also lower because less fuel was used between deliveries and more time could be spent fishing (NPSC 1990; NMFS 2002).

The JVP allocations peaked in 1987, after which, by 1990, increases in domestic at-sea and shore-based processing capacity entirely displaced JVP allocations. In 1986, 920,817 mt, or over 96% of the pollock TAC was harvested by catcher vessels delivering to at-sea and shore-based processors. Three years later, catcher vessels landed only 38% of the pollock TAC, even though nearly the same number of catcher vessels were active in the fishery. Catcher vessels, which had been profitable and successful during the joint venture era, were in trouble. With the phasing out of the Japanese motherships and rapid expansion of the domestic factory trawler fleet which did not require catcher vessels, the options for the catcher vessels were becoming more limited. They could deliver to one of the three domestic mothership operations or to the shore-based processors, but in either case, they were losing out to the factory trawlers, which were more proficient at harvesting pollock (NPSC 1990).

The catcher vessels were not the only companies losing catch share. The shore-based processors, who depended on the catcher vessels for fish, were also *de facto* losers; they were limited by the amount of pollock that the catcher vessels could provide. In 1989, the inshore sector was composed of three major processors: Alyeska and UniSea in Unalaska and the Trident in Akutan. These three facilities had a combined capacity for 470,000 mt of pollock. With Westward Fisheries Inc. scheduled to complete construction of a plant in Unalaska in 1990, inshore capacity was expected to increase to 650,000 mt. With harvests of only 242,278 mt in 1989, catcher vessels delivering inshore were unable to fully supply the existing processors, let alone the Westward plant (NPSC 1990).

Trident was the only inshore processor focused on fillet production, but Trident also produced surimi. Alyeska, UniSea, and Westward focused on surimi production, ensuring the supply of surimi to their Japanese parent companies. These processors also produced roe, fishmeal, and fish oil from pollock and processed a variety of other species including cod, halibut, and crab. Shore-based processors did not face the same space constraints that apply to vessels at sea and were thus in better position to manage inventories in cold storage and to process low-valued byproducts. This was especially true under conditions where vessels were locked into a race for shares of a limiting TAC. Under the race-for-fish, factory trawlers focused on high throughput of high-value products such as surimi and roe rather than maximizing utilization rates. While shore-based processors also had an incentive to maximize throughput, they could recover additional value from fishmeal and fish oil. Nevertheless, this was not enough of an advantage to offset the operational advantages of the at-sea processors (NPSC 1990).

Inshore/Offshore I

The inshore sector realized it was losing the race for pollock. Expansion of the factory trawler fleet was not slowing and the inshore sector was already operating pollock processing lines at well below design capacity. To counter this trend, the shore-based processors decided to lobby for an exclusive sector allocation which would guarantee them a portion of the TAC or an exclusive fishing zone for inshore sector catcher boats extending to a one hundred mile radius around their processors. Faced with losing a race for fish on the fishing grounds, the inshore sector set out to transform the battle into a political contest to be waged before the NPFMC and in Congress.

An early and unsuccessful effort to protect the inshore sector was initiated in December 1986 when the mayors of Akutan and Unalaska asked the NPFMC to create a 100-mile radius fishing zone around Unalaska, wherein fish could be harvested only if they were to be delivered to domestic processors. Had the proposal passed, it would have pushed joint ventures out of productive near shore fishing areas. The request did not lead to Council action but it laid the groundwork for subsequent efforts by the inshore sector to protect their harvesting area (NPSC 1990).

In June 1987, the NPFMC began to look at roe stripping—removal of the valuable roe from female pollock and discard of the remainder of their carcasses as well as all the male carcasses. This practice made financial sense in a fishery geared to maximize throughput of high-valued product and minimize the opportunity cost of hold space, but was overwhelmingly viewed as shamefully wasteful. Roe stripping took place because certain factory trawlers and motherships found that it was profitable to strip roe during the pollock spawning season, which typically takes place between January and the beginning of April. By stripping roe, factory trawlers could minimize their labor costs and dedicate scarce hold space to the most profitable product—roe. A ban on the practice of roe stripping was passed through the Council process in 1990 for the 1991 pollock season as Amendment 14 to the BSAI. By pressing the issue in public, inshore sector sought to further stigmatize factory trawlers which already stood accused of "Hoovering" the sea to the demise of Atlantic cod and other important fishery resources worldwide FMP (Low et al. 1989; Fahys 1990; NPFMC 1990; NMFS 2004).

Near the end of 1988, joint venture harvesters realized that there would be a dramatic drop in the coming year for pollock allocated under JVP and that within a few more years all pollock would be allocated to DAP. Catcher vessels realized they would be losing their contracts to fish for the foreign motherships and they would have few options other than to deliver to shore-based processors. By January 1989, the American High Seas Fisheries Association, which represented the vast number of JV catcher vessels, began to express interest in allying with shore-based processors to advocate for an inshore fishing zone which could be used exclusively by vessels delivering to shore-based processors. Doug Gorden, the Executive Director of the American High Seas Fisheries Association, believed that the Council would adopt a limited-access quota system which did not include allocations of shares to processors, but within that quota system, fish harvested within a certain zone would have to be delivered onshore. This would have guaranteed catcher vessels a portion of the catch (NPSC 1990; J. Plesha, personal communication).

The inshore sector had the support of an important ally in the U.S. Congress; Bundrant of Trident Seafoods had developed a close relationship with Senator Stevens, who maintained strong support for the Americanization of U.S. EEZ fisheries off the coast of Alaska. Earl Comstock, Stevens' staffer for fisheries issues, indicated to representatives of the inshore sector that Senator Stevens would support creation of an inshore fishery zone to protect them from competition with factory trawlers. Comstock felt that it should be handled as soon as possible, as it was a non-election year for Congress, and the Magnuson Act was up for reauthorization. By this time, Senator Stevens was no longer the junior Senator who needed help introducing the MFCMA; he had become a powerful member of the Senate, having already served for over 20 years. Senator Stevens supported the inshore sector because he believed that doing so would mean jobs for Alaska; his support would prove to be vital for this and subsequent issues in the pollock fishery (J. Plesha, personal communication).

At the January 1989 NPFMC meeting, the inshore sector began talking to members of the NPFMC with an aim to have council members ready to consider analyzing an amendment to the BSAI fishery management plan to create specific inshore and offshore allocations of the pollock TAC by the April meeting. The inshore sector realized the difficulty they faced: they would have to convince the NPFMC—which was dominated by Alaska representatives—that the NPFMC should guarantee a portion of the pollock resource to the inshore sector, which was largely foreign-owned and based out of Seattle. Alaskans had sought statehood in part so that fish traps controlled by outside interests could be outlawed and could be expected to oppose regulatory actions that would grant external parties preferential rights to resources offshore of Alaska. Council members from Washington and Oregon could not be counted on to support the inshore sector because the at-sea sector was also almost entirely based out of Seattle and provided an enormous number of jobs to the Pacific Northwest. Thus the inshore sector realized that they needed to win over NPFMC members from Alaska (J. Plesha, personal communication).

Concern about the rapid expansion of the factory trawler fleet was not just an inshore sector concern. At the same January 1989 NPFMC meeting, companies with existing factory trawler investments expressed concern about overcapitalization of the domestic at-sea processing fleet. Pereyra, a NPFMC member who had investments in the at-sea sector, proposed a motion that would

> Establish an immediate cut-off date of January 16, 1989, after which, vessels not in the pipeline ‘may or may not be’ be considered by the

> Council as eligible for participation in the fisheries under the Council's jurisdiction. (NPSC 1991)

Pereyra explained to the Council that no matter what they did, overcapitalization of the groundfish industry was a reality. He estimated that in 1989, there would be 69 U.S. factory trawlers in the North Pacific and in the following year there would be 100. The letter was signed by four individuals in the at-sea sector but was opposed by Trident and other members of the inshore sector who objected to limited access regulations that neglected consideration of shore-based processors (NPSC 1991).

The at-sea fleet sector had no incentive to support inshore processor allocations; they were winning the race-for-fish. Moreover, as a sector, the at-sea processors had a higher rate of domestic investment than did the shore-based processors, which should have given them an advantage in the court of public opinion. Although there had been significant investment from Norwegian, Korean, and Japanese interests, U.S. investors such as Francis Miller of Arctic Alaska Fisheries, Pereyra of Arctic Storm and Profish International, Morgan of Oceantrawl, as well as numerous Norwegian-Americans like Sjong and Uri had invested significant resources into the at-sea fleets. They appeared to hold the advantage in fighting off and delaying any inshore allocation.

The tide unexpectedly turned against the at-sea processors. About a month after the January 1989 meeting, a few factory trawlers surged into the Gulf of Alaska pollock fishery and scooped up more than 37,000 mt of pollock in six weeks. The high level of pollock catch prompted the NMFS to close down the fishery in March, a drastic action in a fishery that normally ran through December and supported a fleet of small Kodiak-based catcher boats (NPSC 1991; NMFS 2002; Wolff and Hauge 2008). Although the factory trawlers had not done anything illegal, the backlash was immediate. The picture of the big, evil factory trawlers taking all the fish from the small, local fishermen was media fodder. The Anchorage Daily News featured a front page article titled "Fleet Dumps Thousands of Tons of Fish," highlighting the practice of roe stripping and denouncing the effects of factory trawlers on local fishing (Bernton 1989). Dave Harville, a Kodiak fisherman with three boats that delivered pollock to local shore-based processors:

> This is the Seattle-ization of our fisheries. They took our fish and shut down their competition. Now, they're going to go on out to [the] Bering Sea and fish the rest of the year. But we can't move the island. (Bernton 1989)

At the April 1989 NPFMC meeting, fishermen and processors from Kodiak, Alaska, requested that the Council consider specific allocations of fish for processing by the inshore and offshore components of the fishery to prevent future preemption of resources by one component of the industry. In testimony at that meeting, Dave Harville described the view that became the mantra for the inshore sector:

> As the at-sea processing segment of our industry has grown, coastal communities have been increasingly concerned that unregulated at-sea processing would result in the demise of coastal communities. What happened with pollock in Kodiak last month proved that coastal communities should be frightened… But unless we want to kiss our coastal communities good-bye this can't be allowed to happen again. Shore-based processors must be given preferential access to the fish within their area. Just because the at-sea fleet is overcapitalized, doesn't mean they should be allowed to devastate coastal communities. (NPSC 1991)

The view, which was being vocalized in front of the Alaska majority council and throughout Alaskan media, caricatured a largely foreign, Seattle-based sector out to destroy the Alaskan coastal communities and their shore-based processors. With Alaskan fishermen from Kodiak coming out in favor of an inshore allocation, it was the perfect coup for the BSAI inshore sector, setting in motion, at the Council level, the idea of a specific inshore allocation. After fierce debate from both sides, the NPFMC voted to request proposals from industry to be submitted to the Council by 9 June 1989, for consideration during the NPFMC's June meeting. After that meeting, the Council newsletter stated that the Council:

> … will adopt formal alternatives at its September meeting, commence analysis in October, and consider taking action in April 1990 to send the resulting amendment package out for public review.

The Council formed a working group, the Fishery Planning Committee (FPC), to work with NPFMC staff and agency personnel to review the various alternatives for an allocation of fishery resources between at-sea and inshore sectors. NOAA General Counsel was asked to advise on the legal viability of the various alternatives. With one ill-considered decision to fish in the GOA pollock fishery, a few factory trawlers opened the door for the introduction of separate inshore and offshore allocations, ushering in an era of turmoil in the fishery that industry participants describe as the "pollock wars" (Plesha, personal communication).

The FPC met on 6 September 1989 and identified several general alternatives, including status quo, super-exclusive registration areas, priority access for inshore deliveries, inshore-offshore allocations with or without special operational areas, a prohibition on factory trawlers in the Gulf of Alaska combined with special areas in the Bering Sea and Aleutians reserved for harvesters delivering to shore-based processing facilities, and traditional tools to extend the seasons and preserve product flow to all sectors of the industry. The Committee recommended that proposals dealing with limited entry and a prohibition on roe-stripping be considered outside of the inshore/offshore issue, as it was outside the scope of the issue and would slow down the inshore/offshore process (NPFMC 1992).

Arguments Against the Inshore/Offshore Allocation

Both sides presented strong arguments for and against the inshore/offshore allocation. Testimony from Pereyra outlines some of the strongest arguments advanced by the at-sea sector. He describes his involvement and investment in the mothership *Ocean Phoenix*, the largest vessel in the U.S. at-sea fleet:

> The reason for getting into this project [the investment of the *Ocean Phoenix*] goes back a number of years when we first became involved in the joint ventures. At that time, we were advised by Congress, including such nobles as Senator Magnuson, Senator Stevens, Congressman Young, and others that the joint ventures weren't going to last forever and while special provision was being given for joint ventures to be prosecuted, we had to look to the DAP sector for a long term operation. With this in mind, a couple years ago as the joint ventures started to peak, we joined together to look at options we might have for getting into DAP fisheries. (NPSC 1991)

The first argument is that development of the domestic at-sea sector was encouraged by the selfsame political leaders who encouraged development of the inshore sector. The owners of the *Ocean Phoenix* had spent in excess of $50 million. Why was it fair to treat the at-sea sector as "second class citizens?" In reference to the proposed preferential allocation to the inshore sector, Pereyra commented:

> We feel [this] is a form of taking, and as such, would require that we be compensated for our losses.

This investment in the at-sea sector was made with the expectation of the status quo; that is, that the current rule structure would not change to favor one sector. It was unfair from the perspective of the at-sea sector for the Council to make fundamental changes that would expropriate the value of capital invested in the at-sea fleet (NPSC 1991).

Ron Pauly, vice president of Oceantrawl Inc., which owned three surimi factory trawlers, further argued that setting inshore/offshore allocations

> … seem[s] in direct conflict with the encouragement that was given to this industry within the last two or three years to Americanize, of which the factory trawler group, as a group, are substantially responsible [for]…It

> seems grossly unfair to be encouraged one year to invest and the following year face the possibility of losing potential livelihood. (NPSC 1991)

Not only did the at-sea sector argue that action alternatives proposed under amendment 18/23 were unfair, but that such an allocation would reduce net benefits to the nation. Pauly argued:

> We are efficient at catching fish. We're efficient at processing fish. And we're extremely efficient at maximizing the market value of that fish. (NPSC 1991)

In the same vein, Pereyra argued that the at-sea sector possessed some additional advantages over the inshore sector:

> The alternatives we had were building a processing plant and putting that processing plant on shore or in a floater near shore and modifying our catcher boats by lengthening them and installing RSW capability so that they could haul fish from the fishing grounds to the plant or floater. Or secondarily, building a processing plant and putting it into a floater and taking the floater to the fishing grounds. After considerable analysis and discussion, we chose the latter. The reason being is that we determined on a business decision basis that this was the most efficient way to operate. It was the most cost effective and it would make us competitive in the international market place, as we could produce the highest quality products at the most competitive prices. (NPSC 1991)

For those involved in the at-sea sector, a conscious decision had been made. It was more efficient and cost effective to operate at-sea. From a business standpoint, at-sea production was more cost efficient than inshore production (NPSC 1991).

Not only were at-sea processing vessels more cost-effective, but the products produced at-sea were of a higher quality, which meant that they were able to obtain higher prices in the market place. Trawlers delivering to shore delivered fish that had often sat in refrigerated tanks for 24-48 hours before processing. At-sea processors were able to get the most value from the pollock. In that regard, Pereyra argued that:

> In actuality, the discrimination against off-shore processors would reduce the overall efficiency and competiveness of [the] domestic industry in the marketplace. In this regard, it's a clear violation of national standard five [in the MFCMA]. (NPSC 1991)

National standard five states that:

> Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose. (MSFCMA 2007)

Processing at-sea was more profitable, and to take fish away from the at-sea sector and give it to the inshore sector was not efficient or competitive but instead served a sole purpose of economic allocation (NPSC 1991).

The at-sea processors also felt that giving the inshore sector an allocation would adversely impact employment:

> The *Ocean Phoenix* project got started by finding a large vessel in which to build and install a processing plant. It required a used container ship 680 feet long. [We] built a large processing plant and have installed that plant in the container ship. The vessel is now in Portland, Oregon being finished and hopefully will be in the Bering Sea in December receiving fish from seven JV catcher boats, or ex-JV catcher boats I should say, producing surimi, fillets, roe, and meal from pollock. Together, we will be employing throughout the year in excess of 400 people. And the total cost of this endeavor is in excess of $50,000,000.
>
> Why are we concerned? We are greatly concerned because the majority of the proposals that you have before you, or the options you have before

> you, to give priority to fish delivered to shoreplants would put limits on our mobility which we feel is very important to our success and would also limit the availability of fishing grounds to us. Such measures would severely damage and probably bankrupt our operation. Hundreds of people would lose their jobs. (NPSC 1991)

One of the most important issues raised by the at-sea sector was the fact that the MFCMA mandates that the EEZ fisheries should be managed in a manner that is most beneficial to the country as a whole. Bert Larkins, AFTA's executive director at the time, pointed out an important topic that was little discussed:

> One, we've heard about how the Magnuson Act requires that some concern be expressed about the coastal communities involved. I agree … I think that this Council's area of jurisdiction [over] coastal communities that would apply here include Newport, Oregon. The[y]include Westport. They include Seattle as much as they do Kodiak and Dutch Harbor. (NPSC 1991)

That is, the impact of any changes needed to be looked at through the eyes of all affected states, not just the State of Alaska. Although the Council was dominated by Alaska representatives, the Council needed to examine what was most beneficial to the country as a whole, as required by the MFCMA (NPSC 1991).

Arguments for the Inshore/Offshore Allocation

The inshore sector countered with several arguments, advocating strongly for an inshore allocation. Their wisest move was, however, to continue to leave the focus on Kodiak fishermen and processors. The inshore sector emphasized Alaska and what would happen to Alaska's rural economies if the at-sea sector were allowed to continue to expand. They argued that the demise of shore-based processors would irreparably harm Alaska's coastal communities through the loss of jobs, income, and tax revenues. Not only would an inshore allocation protect current Alaska jobs, it would increase economic benefits and jobs available to Alaskans. According to testimony of Brindle, of Wards Cove Packing Company, and a 50% partner in Alyeska Seafoods:

> Our company has two plants located on Kodiak Island…I have sitting in my desk drawer, a couple of Corp. of Army Engineer permits for expansion, [but] after the experience of last spring [shut down of the Gulf of Alaska Fishery] … we were shut down. What we do … depends on the action of this Council. We think the future of shoreside communities in Alaska is basically at stake. (NPSC 1991)

Most of the testimony from the inshore sector focused on Alaska, and how the loss of shore-based processors would affect the communities they were located in (NPSC 1991).

It was anticipated that gains from the inshore allocation would most likely accrue to the economies of western Alaska and Pacific Northwest, with Unalaska being the largest winner. With three major pollock processors located in Unalaska, it was expected that the local economy would benefit from stable employment and indirect spending. According to the cost/benefit analysis conducted for the proposed sector allocations, Unalaska stood to gain 388 full-time equivalent jobs. The Washington economy was also expected to benefit, since most shore-based processors were based out of Seattle, and companies tended to recruit a majority of their employees from the region (Iani 1992; NPFMC 1992).

The inshore sector also pointed to some important operational advantages of the factory trawlers, such as their ability to avoid local and state taxes in Alaska; shore-based processors in Unalaska paid a 3% sales tax as well as a 3% state fish tax, 50% of which went back into the local economy. They argued that an increase in shore-based production would benefit the local communities by contributing much needed funding for infrastructure. The tax revenue was an important source of income for communities that had very few other sources of income (NPSC 1990; NPFMC 1992).

The at-sea sector was also able to avoid numerous regulations, such as the State of Alaska water-quality standards and many workplace laws, which only apply to companies on-shore. The NPSC (1990) also points to the high level of foreign investment in the at-sea sector—although it reluctantly recognizes the high level of foreign investment in shore-based processors such as UniSea, Westward, Peter Pan Seafoods, and Alyeska Seafoods, among others. NPSC (1990) outlined three proposals for providing increased protection for the inshore sector. The first was to start the fishing season after April 1, effectively eliminating the race for the valuable roe product, even though it acknowledged that the NPFMC's SSC found no evidence of adverse biological impacts from harvesting spawning pollock. The second proposal was for increased protection for the area around Unalaska, similar to the 100-mile zones first proposed in 1986. The last was a proposal for a 50/50 split of the pollock TAC between the inshore and offshore sectors.

Both the inshore and offshore sectors raised valid arguments. Each sector had grown since the mid-1980s, while investing a significant amount of capital, all with the support of Congress. With the exception of Trident, growth of the inshore industry was a result of U.S. pressure on Japan to encourage plant construction. The Japanese had little choice about making their initial investment, as the United States threatened to withhold their TALFF and JV allocations and would have excluded them from the pollock fishery. The at-sea sector had also invested with the encouragement of Congress. Congress knew that foreign investment supported many of the vessels; nonetheless, it was viewed as a desirable counterweight to Japanese influence in the inshore sector and was in conjunction with U.S. fishermen (Hornnes 2006). Furthermore, domestic investors had a choice whether to invest the inshore or at-sea sectors, and with the exception of Trident and Wards Cove, most choose to invest in the at-sea sector, because it was more efficient and profitable. Perhaps the strongest argument the Japanese inshore sector could muster in support of the inshore/offshore allocation, was that their investment had been coerced and therefore merited a portion of the allocation (NPSC 1990).

Alaska's coastal communities would also be affected if inshore sector were to be wiped out by continued growth of the at-sea sector, although the magnitude of the impact was less certain. Both the inshore and offshore sectors required support services in Unalaska. Hotels, airplane, and grocery services were used by fishing and processing crew. There was also the occasional need for repair and supply services. For the most part, however, both sectors purchased their supplies from Seattle, hired nonresident and foreign crew and laborers, and had headquarters in Seattle or elsewhere outside Alaska. In addition, the fishing and processing crew often worked twelve to sixteen hours a day, so the amount of money they spent in Unalaska or Akutan was minimal. Companies such as Trident, have company stores set up for most necessities and barge up their own fuel. A majority of the catcher boats that participated in the mothership and inshore sectors were based out of Seattle and elsewhere outside of Alaska. If shore-based pollock processors were to have closed, there would have been adverse impacts in Unalaska and Akutan, but some of the adverse impacts would have been offset by increased demand for support services related to the at-sea sector. The bigger loss to the communities would have been the loss of tax revenue. Akutan's budget is almost entirely supported by local taxes paid by Trident. While Unalaska has a somewhat more diverse tax base, the taxes paid by the shore-based processors are a substantial component of city finances (NPSC 1990; NPFMC 1992).

In reality, in the 1990's, the EEZ fisheries off Alaska were to a large degree "Seattle's fisheries." Everyone involved in the fishery knew this, and the goal of inshore sector was to position themselves as "more" Alaskan in an effort to encourage Alaskan members of the NPFMC to favor a sector allocation favorable to the inshore sector. They knew, however, the precariousness of their position. At the time of the September 1989 NPFMC meeting, Plesha felt it was more difficult to argue for a quota than just for the "protection from the factory trawlers ability to pulse-fish," which would have simply meant protection from factory trawlers in a zone around Unalaska. The inshore sector had to "continue to make Alaska aware how important this issue is to the State" (J. Plesha, personal communication). It was, however, going to be difficult to do, as a cost/benefit analysis conducted for the NPFMC suggested that implementation of the proposed sector allocations would likely reduce net national benefits by $153 million (Miller et al. 1992).

Reaching out to Congress

The at-sea sector seemed to realize it was fighting a losing battle at the NPFMC level. While it continued to defend and represent itself before the Council, the at-sea sector began to focus effort at a congressional level. The at-sea sector lobbied in favor of changes to the MFCMA, which was up for renewal in 1990, with an aim to increase the number of Washington and Oregon representatives on the Council. Pushing for the seats was a risky maneuver with a potentially big payoff. With additional seats, the at-sea sector hoped to be able to block the creation of an inshore zone or an inshore sector allocation, but a failed effort to amend the MSFCMA risked stiffening support for the inshore sector among Alaskan appointees to the NPFMC. The at-sea sector enlisted the help of Washington State's Democratic congressional delegation, although it was unable to gain the support of Washington senator Slade Gorton. He maintained careful neutrality as he had constituents on each side of the dispute. As a countermeasure, the at-sea sector secured the services of Jim Gilmore, an influential D.C. lobbyist (Brown 1992a; J. Plesha, personal communication).

The inshore sector seemed to have the support of Senators Stevens and Murkowski of Alaska, as well as Alaska congressmen Don Young. However, Young, who had pledged his support to the inshore sector, suggested that a compromise might be in order, offering one additional seat for Washington and Oregon—as long as Alaska received one in return. The inshore sector expressed its strong opposition to Young's suggestion, telling Young that if he even talked compromise, many Alaskans would be furious. In addition to directly courting Congress, the inshore sector hired Charles Black of the high-powered public-affairs firm Black, Manafort, Stone, & Kelly. Black was highly influential in political circles, and was later appointed co-chair on President Bush's re-election campaign in 1992 (Brown 1992a; J. Plesha, personal communication).

Both parties to the inshore/offshore contest also tried to argue their points through the media, with the at-sea sector focusing their efforts on the Washington state area and the inshore sector focusing on Alaska. The Seattle Times published various articles, many of them supporting the factory trawlers and complaining of NPFMC bias against the at-sea sector (Brown 1992b; Schaefer 1992a; Schaefer 1992b; Schaefer and Wilson 1992). The Seattle Times posted stories of local Seattle fishermen who fished catcher vessels in the at-sea sector who opposed an inshore allocation (Anderson 1991a; Anderson 1991b; Brown 1992a). The inshore sector countered, with John Iani of the Pacific Seafood Processors Association repeatedly writing letters to the editor, contending that the Seattle Times articles omitted relevant facts favorable to the inshore sector (see, e.g., Iani 1991 and Iani 1992). Articles favoring the inshore sector appeared in Alaska, with articles in the Anchorage Daily News covering topics such as the factory trawler's exemption from the Fair Labor Standards Act's minimum wage and overtime requirements (e.g., ADN 1990 and Bernton 1990).

The at-sea sector also focused their efforts elsewhere. Emerald Seafoods, a factory trawler company, sold a substantial share of itself to Chugach, an Alaska Native corporation. Senator Stevens had historically used his Congressional pull to benefit Native Alaskans, and this seemed to be a ploy to influence the Senator. Indeed, Eric Silberstein, CEO of Emerald Seafoods, told participants at the December 1989 NPFMC meeting that now that Chugach owned part of Emerald Seafoods, Senator Stevens would back off the inshore/offshore issue. Not only that, he also asserted that Emerald Seafoods would be operating in the Gulf of Alaska in the spring of 1990. "Why not," Silberstein said at the meeting. "It's legal and we have an Alaska Native corporation as part owners. We have just as much right to operate there as anyone" (J. Plesha, personal communication).

If the at-sea sector had come out right after the 1989 Gulf of Alaska pollock closure and volunteered to refrain from fishing there in future years—much like the foreign fleets did in the early 1980s in the 100-mile radius around Unalaska, the inshore/offshore amendments may have been stopped. But with the race-for-fish and the instability within the fishery, factory trawlers were unable to organize a unified response.

And while Silberstein was correct that Emerald Seafoods and other factory trawlers could fish the Gulf of Alaska, it was not a wise idea to broadcast this information. Instead, it probably just reinforced the tarnished image of the factory-trawler industry. Perhaps not coincidentally, NOAA shut down the Gulf of Alaska pollock fishery entirely in 1990, citing conservation concerns about the pollock biomass. Indignant, Emerald Seafoods sued NOAA, claiming the shutdown

> … is really a political move against factory trawlers. To label it a conservation measure aimed at preventing overfishing is a complete misrepresentation. Its purpose is quite clear—to keep trawlers out of the Gulf. (Associated Press 1990)

By 1990, it was apparent to the at-sea sector that a plan amendment protecting the inshore sector was going to be passed by the NPFMC. Factory trawlers decided to hire Bill Timmons to lobby the White House. Timmons was a former Deputy Assistant to President Nixon, a former Assistant to President Ford, and National Director for President Reagan in 1980 and 1984. His connections in Washington, D.C. were considered second to none. Trident, who was involved in a 50-50 venture with ConAgra, a diversified food company, used Paul Karody, ConAgra's lobbyist, and Senator Stevens to counteract Timmons' influence. With strong lobbying on both sides, AFTA was unable to sway Congress to amend the MSFCMA to add more seats for Oregon and Washington to the NPFMC, and without that change, it was unlikely that the at-sea sector would be able to change the preferred alternative or final decision through the Council process (J. Plesha, personal communication).

Meanwhile, the inshore/offshore debate continued in NPFMC meetings. At the April 1990 meeting, staff members for the Council indicated that the analysis for the inshore/offshore issue was going to have to be moved back, due to the complexity of the issue. With that change, the time for a final decision was to be moved to June of 1991. To reinforce the negative aspects of factory trawlers at the June 1990 NPFMC meeting, the inshore sector brought three fishermen up to testify, with the intention of establishing a record of grounds preemption, grounds souring (from discarded carcasses from roe-stripping), gear conflicts, and localized depletion caused by factory trawlers (J. Plesha, personal communication).

At the September 1990 NPFMC meeting, the issue of roe stripping was brought up for a vote. Although being considered separate from the inshore/offshore legislation, it was associated with the at-sea sector and portrayed them in a negative light. All at-sea processors came out in favor of a ban on roe-stripping, although a proposal to stop all fishing during the spawning season was rejected. Instead, the Council decided to look at allocating a portion of the pollock TAC to the spawning season, but decided to delay the vote until December in order to check with the NOAA legal counsel. The final decision by the NPFMC allocated the pollock TAC to “A” and “B” seasons, with up to 40% of the TAC allocated to the A or roe season (January-March) and the remainder to the B season (June-October). This was done with the intent of protecting the pollock during the spawning season, which some thought was important to the sustainability of the stock. Although there is no clear evidence that fishing at approved levels has a negative impact on the reproductive capacity even if the fishing were focused on spawning aggregations (NPFMC 1992, NMFS 2004).

After much debate between the Council and the FPC, the final draft of the Inshore/Offshore Draft Supplemental Environmental Impact Statement was completed for the April 1991 meeting and sent out for public review. In June 1991, after public review, the Council voted by a 7-4 margin to pass Amendment 18/23. The preferred alternative consisted of five major components:

1. For the Gulf of Alaska, 100% of pollock and 90% of Pacific cod would be reserved for vessels delivering to shore-based processors.
2. For the Bering Sea, the pollock TAC was to be allocated between the inshore and offshore sectors to be phased in over three years with the percentage

reserved for the inshore sector starting at 35%, then rising to 40% in the second year, and 45% in the third year.

3. A catcher vessel operational area reserved for a specified time for inshore harvesters.
4. A sunset date of 31 December 1995 with reversion back to the status quo ante unless the Council adopted a comprehensive rationalization management strategy. Strategies to be considered included limited entry, individual fishing quotas (IFQ), and a continuation of the inshore-offshore allocation. And,
5. A 7.5% allocation of the Bering Sea pollock ABC for a Western Alaska Community Development Quota (CDQ) program.

The preferred alternative contained the important elements that the inshore sector desired: a guaranteed allocation of the pollock TAC, which was to be ratcheted up over time and a zone around the inshore processors which gave the inshore catcher vessels priority to the resource.

The preferred alternative also included a new and innovative component, the CDQ Program which set aside 7.5% of the pollock TAC to foster community development projects in Western Alaska. Eligibility and criteria for qualification in the program was to be established by Alaska's Governor in consultation with the NPFMC, although the actual allocations would be released by the NMFS Alaska Region Office on behalf of the Secretary of Commerce (NPFMC 1992).

The initial rationale for the CDQ dates back to the Council's Comprehensive Fishery Management Goals, which were adopted in 1984. The third goal called for the promotion of economic stability, growth, and self-sufficiency in maritime communities, with an expectation that improving the opportunities for maritime communities to enhance their self-sufficiency would benefit the region and the nation (NPFMC 1992). Henry Mitchell, an NPFMC member who represented western Alaskan interests, together with Harold Sparck, a rural-fisheries activist, devised the concept of the CDQ program and a strategy to use the inshore/offshore issue as a vehicle to create it. Mitchell was a lobbyist for

Southeast Alaska charter fishermen, but had roots in western Alaska. Sparck was a resident of Bethel, Alaska, and headed an advocacy group, Nunam Kitlutsisti— Yup'ik for "protectors of the land". Mitchell and Sparck wanted to create jobs to combat Western Alaska's seemingly hopeless poverty. They believed that Alaska's coastal villages deserved a cut of the hundreds of millions of dollars of fish being caught off their shores and came up with an idea to make it happen (DeMarban 2008).

The idea had additional supporters. In 1988, Paul Fuhs, mayor of the city of Unalaska circulated a six-page proposal to fishing industry members, proposing the idea of CDQs:

> The clearest way to ensure that local communities will benefit from the bottom fishery is to allocate a Community Development Quota (CDQ) directly to Alaskan communities. This quota would be a powerful tool for providing jobs and financing for boats and harbor developments leading to stable rural economies.

At the April 1989 NPFMC council meeting, Fuhs testified in favor of some type of quota system,

> which sets aside a community development quota for communities who have not yet had a chance to participate and can use this quota to leverage financing for the appropriate size vessels that it would take to process or to get the processing equipment.

He suggested "45% to fishermen, 45% to the processors, [and] 10% to as a community development quota" (NPSC 1991).

At the June 1990 meeting, Mitchell, who was serving on the NPFMC at the time, proposed that CDQs be given to disadvantaged communities based upon recommendations of the Governor of Alaska to the Secretary of Commerce. To be eligible, a community must be located accessible to fishing grounds, have little economic viability outside of commercial fishing, have cultural dependence upon fishing, and not have previously substantially developed harvesting and processing capacity. He was supported by Council member Larry Cotter, who was a strong ally of the inshore sector.

As the council debated the inshore/offshore issue, Mitchell added the CDQ amendment to the preferred alternative. Mitchell believed those Council members who opposed the inshore allocation voted to add the CDQ amendment even though they opposed it, thinking that the Secretary of Commerce Barbara Franklin would reject the entire measure because of the CDQ amendment. According to Mitchell, Franklin did not reject the package, because Senator Stevens carried through on his commitment to secure her approval (DeMarban 2008).

NMFS began its required review of Amendment 18/23 on 1 December 1991. On 4 March 1992, NMFS approved Amendment 23 to the GOA FMP and approved Amendment 18 to the BSAI FMP with two exceptions. First, implementation of the sector split would have to be delayed until the 1992 pollock B season, to allow time for Secretarial review and required public notice and public comment period. Second, NMFS deemed that while a 35%/65% split would satisfy MSFCMA National Standards, proposed increases for the second and third years were not consistent with the National Standards. The NOAA Administrator stated that NOAA was not opposed to the concept of an allocation between onshore and offshore interests as an interim measure pending development of a solution to overcapitalization—ideally, a market-based solution. NMFS's disapproval of the BSAI pollock allocations for 1993 through 1995 was also based, in part, on a cost/benefit analysis prepared by NMFS that indicated a net economic loss to the Nation of $153 million under the proposed allocations for years 1993 through 1995 (Miller et al. 1992). This was found to be a direct violation of national standard 7 and Executive Order 12291, which directs the fishery councils to consider the economic implications of their actions. This marked the first time since the passage of the MFCMA that a cost/benefit analysis was cited as evidence for a significant U.S. fisheries decision (Herrick et al. 1994). The NOAA Administrator urged the Council to work as expeditiously as possible toward some method of allocating fish other than a free-for-all open access fishery or direct government intervention. It was also noted that preventing preemption by one fleet by another, safeguarding capital investments, protecting coastal communities that are dependent on a local fleet, and encouraging fuller utilization of harvested fish were desirable objectives consistent with the Magnuson-Stevens Act (NMFS 2002).

At its April 1992 meeting, the Council considered NMFS's objections and decided to revise Amendment 18. The Council supplemented its previous analysis of allocation alternatives. At a special meeting to consider this issue in August 1992, the Council again considered the comments of its advisory bodies and the public, adopted a preferred alternative, and submitted it to NMFS as revised Amendment 18. As adopted by the Council, revised Amendment 18 would have established a 35/65 inshore/offshore allocation for 1993, the first year of the revised amendment. The inshore allocation would then have increased to 37.5% for 1994 and 1995. In addition, revised Amendment 18 proposed two changes to the CVOA. Under revised Amendment 18, the CVOA would only be in effect during the pollock B Season (1 September to 1 November), and motherships (and factory trawlers operating as motherships) would be allowed to receive deliveries and process pollock inside the CVOA as long as they did not engage in directed fishing for pollock themselves. In September 1992, the Council submitted revised Amendment 18 to NMFS for review and approval (NMFS 2002).

On 23 November 1992, after consideration of the revised amendment, public comments, the record developed by the Council, and the analysis of the potential effects of the proposed amendment, NMFS again partially disapproved revised Amendment 18. NMFS approved pollock allocations of 35% and 65% for vessels catching pollock for processing by the inshore and offshore components, respectively, for the years 1993 through 1995, and the establishment of the CVOA. However, NMFS disapproved the 2.5% increase for 1994 and 1995, finding that the sole purpose of the increased allocation to the inshore component during those years was economic, and therefore, in violation of national standards 4, 5, and 7 of the MSFCMA, as well as Executive Order 12291. The final rule implementing these decisions was published on 24 December 1992 (Miller et al 1992; Herrick et al 1994; NMFS 2002).

AFTA fought the sector allocations and the CDQ in court, hoping to overturn the regulations as a violation of the MSFCMA. They sought an injunction against the new harvest regulations, but the new allocations were upheld by United States District Court Judge Barbara Rothstein on 24 July 1992. The at-sea fleet was left with no choice but to comply with the regulations.

With the inshore/offshore allocations in place, the offshore sector was headed for a tumultuous time. The inshore sector had won the political battle, guaranteeing itself a larger share of the pollock TAC and a measure of stability. The offshore fleet, on the other hand, had just gone through a period of rapid expansion in the number of active vessels and in the capacity of those vessels. The number of factory trawlers harvesting pollock had grown from a single vessel in 1985 to 54 in 1991. The capacity now far exceeded the quantity of pollock available to the at-sea sector.

The market was able to support the new vessels in 1991 and 1992 for a few reasons. The Japanese had controlled imports of seafood until the late 1980s through the use of import companies, limiting the introduction of U.S.-produced seafood products, and colluding on prices offered for U.S. seafoods. As a result, many domestic processors of pollock, such as Trident, initially focused their efforts on finding buyers in the U.S. market. With the Japanese losing most of their pollock allocation to the new domestic at-sea fleet, Japanese companies had no choice but to turn to U.S. processors for surimi and other products. But, they continued to exert monopsonistic control over import prices by funneling purchases through import/export companies that had the authority to collude to minimize prices paid to U.S. exporters.

The unequal balance of market power changed in 1990 when Røkke spearheaded formation of the United States Surimi Commission (USSC) under the authority of the Exports Trading Company Act of 1982. The Act was passed by Congress to stimulate U.S. exports of products and services. It allowed the U.S. Department of Commerce to issue a certificate which entitled a holder to a limited exemption under federal and state antitrust laws. The certificate

> … has enabled our members to deal with a myriad of import quotas and other trade barriers that previously thwarted U.S.-owned fishing

> companies from successfully competing in various foreign markets—particularly Japan, the largest surimi market in the world. (D. Christensen, personal communication)

The USSC allowed the domestic at-sea fleet to establish a common negotiating position to offset the strong negotiating position of the Japanese import/export companies.

> These are efforts that would be dauntingly difficult for relatively small independent companies to accomplish on their own behalf. (D. Christensen, personal communication)

With control of a relatively large portion of the pollock surimi supply, the USSC was able to negotiate higher export prices.

With diminishing control over surimi sources and prices, as well as decreases in the amount of surimi held in Japanese cold-storage facilities, a perceived shortage of surimi occurred in Japan. Prices for surimi tripled over 1991 and 1992, as Japanese firms built up their inventories (D. Christensen, personal communication). The elevated surimi price partially offset the reductions in catch-per-boat caused by expansion of the at-sea sector and allowed the large number of factory trawlers to earn enough to continue fishing. However, with reduced catch shares entailed by the inshore/offshore allocation in the latter half of 1992 and unsustainable surimi prices, the pollock fishery was set up for a tumultuous period (Sproul and Queirolo 1994).

Implications of Inshore/Offshore I

The passage of Amendment 18/23 gave inshore processors protection from the factory trawler fleet and nearly doubled the amount of fish delivered during the previous year. This in turn allowed catcher vessels, which had been displaced by the transition from foreign JV operations, an opportunity to harvest fish. The sector allocations did not, however, address the more import issues facing the pollock fishery: overcapitalization and the associated race for fish. With estimated combined processing capacity of the inshore and offshore sectors reaching 3.2 mmt in 1990, and only 1.385 mmt allocated for catch, there was far more capacity than was needed to harvest and process the pollock in the Bering Sea (NPSC 1990).

If a fishery provides profitable opportunities and entrance to the fishery or investment in fishing vessels and vessel upgrades are unconstrained, more and more harvesting and processing capacity will enter the fishery. Without a TAC, unconstrained capacity growth decimates fish stocks. Imposition of a TAC can prevent overfishing and stock collapse, but in the absence of efficacious capacity constraint fisheries generally devolve into economically perverse derbies wherein vessels race to catch as much fish as they can before the TAC is met and the fishery closed. Under such circumstances, fishing companies tailor their operations to maximize catch-per-day by overspending on additional horsepower to get to the fish quicker, by building larger holds on the boats to be able to fish longer, and by spending more money on spare parts and supplies to ensure that their vessels can stay out longer. Vessels under a race-for-fish will fish under unsafe conditions, in order to ensure that they are able to catch as large of a share of the fish (and therefore revenues) as possible—as one trip can mean the difference between profitability and loss. Background documents written for the FCMA in 1976 recognize this.

> Often too many fishermen, vessels, and gear concentrate in "harvesting" a particular species which may result in overfishing. When this happens, harvesting costs of fishermen increase and their efficiency decreases. More fishermen often means less catch for each. To conserve fish resources, States have enacted regulations which generally give little consideration to fishermen's economic efficiency. As the economic viability of fishermen becomes impaired, obtaining financing at reasonable rates of interest and with reasonable loan payback periods becomes more difficult for them. (GAO 1976)

Fishing under these conditions leads to the shortening of seasons. A classic case of this was the Pacific halibut fishery which had collapsed from a year-round fishery to a two-day season in the mid-1990s. Vessels in the halibut fishery would catch as many fish as possible on those two days and the catch would be thrown into freezers for processing at a future date, meaning lower prices were being paid for the product. The pollock fishery was headed in the same direction. Factory trawlers had been engineered to operate for 10 or 11 months a year. But as harvesting and processing capacity flooded into the fishery between 1988 and 1991 and catches were secured under a race for fish, NMFS responded with offsetting reductions in season length. By 1991, the pollock A season had been reduced to 53 days and the B season had been reduced to 95 days; five months of fishing time for vessels designed, financed, and built under expectations of longer seasons and correspondingly larger catches.

Compressed seasons due to the increased numbers of factory trawlers also meant lower-quality products, lower product recovery rates, and lower valued product forms: vessels were operated to produce products that were the fastest to produce. During this time, most at-sea vessels focused on surimi production, which is quicker and less labor intensive than fillet production. The race-for-fish was also behind the incentive to roe-strip before doing so was banned; it was more profitable to catch as many fish as possible, keep the high-valued roe and discard everything else. After the ban on roe-stripping was in place, it was still advantageous to strip the roe and create low-quality surimi and fishmeal products from the carcasses, rather than produce labor-intensive fillets. In the absence of rights to predetermined shares of the TAC, the individually sensible but collectively irrational decision was to maximize catch and throughput rather than maximize quality or product recovery rates.

Inshore/Offshore I did nothing to address the root issue of overcapitalization. In fact, for the at-sea sector, it intensified an already heated race for fish: instead of having access to nearly 80% of the TAC, the at-sea sector was limited to a maximum of 65% of the TAC. For the inshore sector, although they were now guaranteed 35% of the TAC, catcher vessels had taken over a million mt of pollock in JV partnerships in 1987, so Inshore/Offshore I simply guaranteed them a share of the TAC that was much smaller than they had taken before the rapid expansion of the domestic at-sea sector. The three motherships in the at-sea sector had, for the most part, their own fleet, so most of the former JV fleet was locked into deliveries to the inshore sector (NPSC 1990).

Because Inshore/Offshore I failed to address overcapitalization, the race-for-fish quickly intensified within each sector. From 1993, the first full year of sector allocations, through 1997, annual season length shrank by 33% in both the inshore and offshore sectors (Figure 1.4; Figure 1.5). The factory trawler fleet was arguably hurt the most; as it saw its already short seasons shrink more: the valuable A season, where the profitable roe is primarily harvested, shrank in half for the at-sea producers, from 53 days in 1991 to 26 days in 1995.

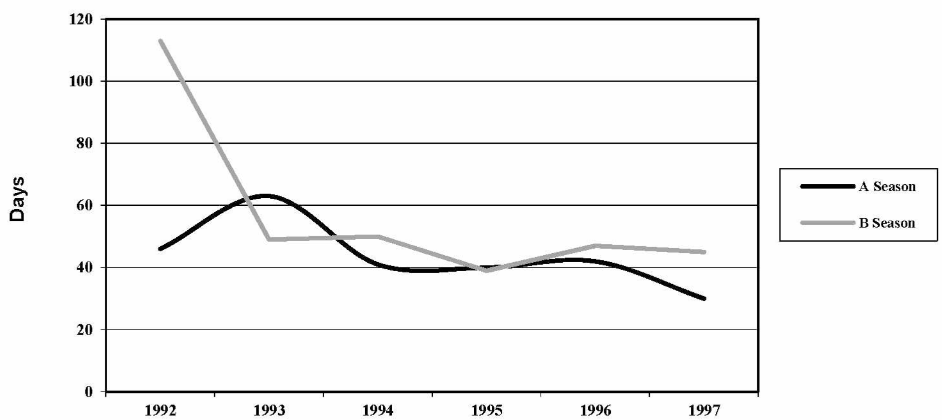

Figure 1.4. Inshore season length.
Source: NPFMC (1998).

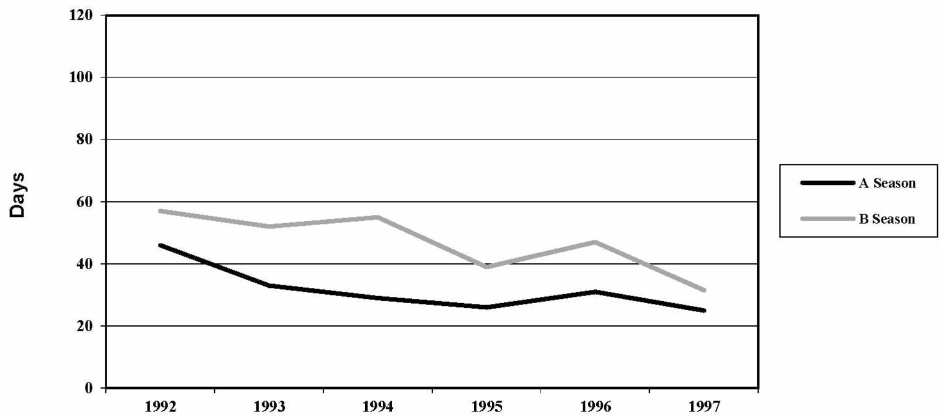

Figure 1.5. Offshore season length.
Source: NPFMC (1998).

High surimi prices in 1991 and 1992 helped the factory trawlers weather the shortened seasons and ensuing reduction in average catch-per-vessel, with many companies making just enough to get by. In 1993, however, they were hit with a perfect financial storm. First, the factory trawlers faced their first full season under Inshore/Offshore I, meaning their catch share was to be reduced by 12.6%. Second, the factory trawlers faced a changed surimi market. At-sea vessels had turned their focus to producing more surimi. Russia, seeing the increased demand and prices for surimi, also stepped up production. In 1993, with Japanese inventories full and the additional product in the marketplace, surimi prices plunged. Factory trawlers were hit hard, and it had an immediate effect on the industry (NPFMC 1995a; Hornnes 2006).

With limited ability to move the factory trawlers outside the U.S. EEZ, the banks that made the loans to build and convert vessels were in immediate danger. Norway's Christiania Bank, which had substantial loans tied up in the factory trawlers, initially chose a bridge-building strategy with the expectation that individual transferable quotas (ITQ) would be passed. Catch-share systems involve entitling beneficiaries exclusive rights to harvest a certain percentage of TAC. Depending on the type of catch share system, the entitlement can be held by individuals or corporations; it can be bought, sold or leased to others; and in many cases, even used as collateral for loans. Norwegian banks and investors hoped and expected that an ITQ system would be implemented before Inshore/Offshore I expired (Hornnes 2006).

Even with the support of some banks, 1992 through 1998 were characterized by numerous bankruptcies and substantial consolidation in the at-sea sector. Although there were 54 factory trawlers fishing in 1991, records indicate that only 25 vessels fished in all six years from 1991 through 1996. Major turnovers occurred with an annual average exit rate of 25% over that time period. When companies failed to meet obligations, banks were left holding vessels that had few alternative uses. With too many vessels already fishing in the Bering Sea and few other fisheries large enough to support large vessels, banks chose to cut their losses and sell the vessels at whatever price they could get even if the sales price was insufficient to cover the bank's equity. This allowed repossessed vessels to enter the fishery at a lower capital investment, and therefore, the ability to turn a profit with a smaller amount of fish than had been needed to support the same vessel at an earlier date (NPFMC 1998; Hornnes 2006; Pollock Conservation Cooperative 2008).

Where other investors were scrambling to liquidate their assets, Røkke, through American Seafoods, saw these tumultuous times as an opportunity to purchase factory trawlers at fire sale prices. Because the initial allocation under a ITQ system is usually based on the catch history of the vessel, Røkke set out to acquire as many vessels and as much catch history as he could, even if it meant being saddled with unprofitable vessels until an ITQ was implemented. In short order, Røkke became the primary player in the factory-trawler fleet (Hornnes 2006).

American Seafood's first purchases were two factory trawlers, the *Pacific Scout* and *Pacific Explorer*, formerly the *Crystal Scout* and *Crystal Viking*, which had been converted in Norway in 1988. Røkke added to his fleet with purchase of the *Royal Prince*, which had been converted in Norway in 1987 for nearly $11 million financed with 100% of equity. In the same year, 1994, Røkke's partners sold out leaving him with a 90% ownership stake in American Seafoods which then controlled six factory trawlers. Another major player, Tyson Foods Inc., entered the pollock-factory-trawler fleet in 1992 when it purchased Arctic Alaska Fisheries for an estimated $212 million. Tyson, a leader in the poultry industry, was looking to expand their offerings to seafood products. Arctic Alaska's fleet of 31 vessels included five at-sea processing vessels involved in the pollock fishery. Tyson bought Arctic Alaska Fisheries at its peak, taking on substantial debt, but the purchase made Tyson an instant player in the pollock fishery. The last significant purchase made under Inshore/Offshore I was by Pereyra and his company, Arctic Storm Fisheries. In 1994, Arctic Storm Fisheries purchased the *Michelle Irene* and renamed it the *Arctic Fjord*, bringing the number of factory trawlers his company owned to two. While the purchases made by Tyson, American Seafoods, and Arctic Storm were significant, they merely foreshadowed even greater turmoil to come (Hornnes 2006).

Inshore/Offshore II

With the turmoil in the factory trawler fleet, the NPFMC process was followed with great anticipation. Inshore/Offshore I was intended to be a short-lived bridge to a comprehensive rationalization program that would end the race-for-fish and allow an orderly partial decapitalization of the fishery. The at-sea sector favored some type of ITQ or license-limitation program. In addition, it was felt that some type of buyback program would be needed to remove excess capacity from the fishery. Shore-based processors remained opposed to rationalization of the fishery unless the program included some type of processor share. Moreover, Trident and other inshore companies realized they would not receive large amounts of quota if shares were granted based on past catch history. It was in the best interest if the inshore sector to stall rationalization as long as possible while pressing for interim measures that would allow them to increase their catch history.

While vessels continued to race each other for fish in the Bering Sea, their owners jockeyed for advantage in the Council arena and corridors of Congress. Factory trawlers, desperate to stem capacity growth, pressed for a moratorium on new vessels. The Council began to look at a Comprehensive Rationalization Plan (CRP) in November 1992, shortly after they had finished with Inshore/Offshore I, and established the Comprehensive

Planning Committee (CPC) to suggest an appropriate course of action. In January 1993, the CPC determined that some type of limited-license program or IFQ system would best address the current issues facing the fisheries in the Bering Sea. The CPC determined that a limited-license system could deal with five of the fourteen issues that needed to be addressed in rationalization of the pollock fishery and that an IFQ system could deal with thirteen of the fourteen issues (NPFMC 1995a).

The CPC, meeting June 1993, looked into limited license programs and individual fishing quotas, as well as into allocations to processors or a possible two-pie scheme with allocations to harvesters and processors, for all groundfish and crab fisheries in the Bering Sea. Planning for the CRP at the September 1993 meeting laid out a number of alternatives. The first alternative was the overall groundfish/crab IFQ alternative, which was to be identified as the preferred plan. The second alternative was a two-pie IFQ alternative, which would create Individual Processor Quotas (IPQs) to mirror the IFQs for the harvesting sector. Although prejudged as illegal by NOAA general counsel, the Council wanted to move forward with the idea for analytic purposes. The third alternative was a limited-license program (LLP) (J. Plesha, personal communication; NPFMC 1995a).

The focus remained on IFQs for all groundfish and crab fisheries, but the scope of the plan appeared to cover such a large number of interests that it further slowed down the process. The CPC was disbanded when the Council acknowledged that the contentious issue would require the entire Council's full attention. At the January 1994 meeting, CRP dominated the discussion. It was determined by the Advisory Panel that a license-limitation program would allow for the quickest implementation. However, the Council concluded that a license-limitation program would not address the issue of the inshore/offshore allocations, and asked staff to begin evaluation of continuing the inshore/offshore allocations program beyond the 1995 sunset date. The Council specifically instructed staff to look at extending the provisions of the Inshore/Offshore I for an additional three years to allow for a continued development of the CRP (NPFMC 1995a).

The at-sea sector, fearing additional reductions to their share of the pollock TAC, came out in support of Inshore/Offshore II. It had watched the Council try to steadily raise the inshore sector allocation in Inshore/Offshore I, and with no way to stop the adoption of the three-year extension through 1998, decided it was better to support a no change extension of Inshore/Offshore I while the Council took up design of a pollock IFQ program. Consequently, the at-sea sector testified in favor of the plan, and continued to push for the adoption of the CRP in the pollock fishery.

The inshore sector also backed a three-year extension of Inshore/Offshore I, but pushed for an increased inshore allocation. The inshore sector had growing excess capacity and desired a higher proportion of the TAC, whether it came through an IFQ program or through an increased sector allocation. As a vertically integrated company, Trident openly opposed any IFQ program that neglected to include protections for processors. In general, it appeared that opposition to an IFQ system was to be maintained until either processor quotas were included or a plan that provided increased benefits to the inshore sector was implemented. Politically, this gave Trident the power to hold off support for any ITQ proposal until they were offered something in return for their support. With the rate of bankruptcy in the at-sea sector, it appeared that at some point the offshore fleet would have to give up some of the TAC in order to get its support, or face continued financial instability.

By 1995, the NPFMC had made some progress on a long-term plan. In June 1995, it adopted a license-limitation program for the groundfish and crab fisheries, although a final rule was not submitted to NMFS until June 1997. The Council also passed Amendment 38/40, later be known as Inshore/Offshore II. Inshore/Offshore II was nearly identical to Inshore/Offshore I. It continued the 65%/35% sector allocations because the Council anticipated that changing the allocation would require rigorous cost-benefit analysis that was unlikely to support an increased inshore allocation. Inshore/Offshore II also carried on the pollock CDQ program and CVOA with two exceptions. It reduced the dimensions of the CVOA and allowed the at-sea sector to fish in the CVOA once the inshore quota was filled (NPFMC 1995a).

Reauthorization of the Magnuson Stevens Act

Although Inshore/Offshore II was little more than a three-year extension of Inshore/Offshore I, it had a significant impact on the factory-trawler fleet. Banks had provided bridge financing, hoping that an IFQ system would be implemented by 1995; they realized that it would be three or more years before a CRP plan could be implemented. In addition, although a LLP had been approved by the Council (NPFMC 1994), NMFS had not yet completed draft rules to implement the LLP, let alone submitted the draft rule for Secretarial review. The uncertain regulatory process and uncertainty about the ultimate outcome led banks to lose confidence in the ability of fishing companies to make good on their vessel-backed loans. Owners of factory trawlers that had endured losses in anticipation of receiving windfall capital gains under an initial allocation of IFQ also came to realize that there would be no near term solution to the overcapitalization and race-for-fish problems and thus the unenviable prospect of at least several years of continued operating losses.

Another bill, which was developed and passed outside the Council process, further impacted the possible introduction of IFQs. An amendment to the MFCMA was passed in 1996 and put into law in 1997. The legislation, which renamed the MFCMA the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), focused on overfished fisheries, protecting essential fish habitat, and reducing bycatch. The bill also established a moratorium on new IFQ management regimes until after completion of a National Research Council study of the effects of IFQs (National Research Council 1999).

The MSFCMA effectively eliminated IFQs as an option for rationalizing the pollock fishery. Not only were the shore-based processors relieved of the threat of adoption of a fisher-only IFQ program that would work to their disadvantage, but the MSFCMA also stipulated that “the term ‘individual fishing quota’ does not include a sector allocation,” thereby providing assurance that the legitimacy of the inshore/offshore allocation scheme could not be challenged.

While a specific rule on a LLP was still being debated, it was clear that no matter what that rule entailed, it would do little to change the battle between the inshore and offshore sectors. At most, the LLP would stop the addition of new vessels to the fishery; it would do nothing to reduce existing superfluous harvesting or processing capital. In addition, the at-sea sector had to look forward to an ongoing and likely inefficacious political battle against increases in the inshore allocation (NPFMC 1994). The combination of Inshore/Offshore II and the moratorium on IFQs triggered a wave of bankruptcies in the at-sea sector; with no end to the race-for-fish in sight, bankruptcy and consolidation became the norm. American Seafoods, which owned six factory trawlers in 1996, seized the opportunity to buy up every bankrupt factory trawler it could find. The company first bought the *Ocean Rover*, a vessel which had been converted in Norway. It then signed an agreement with Oceantrawl Inc., the U.S./Japanese-owned company represented by Bob Morgan, to manage its factory trawlers, the *Northern Eagle*, *Northern Hawk*, and *Northern Jaeger*, a fleet it later purchased. American Seafoods' next major purchase included five vessels from International Marine Management, Inc., which had been owned by investors including Uri, Sjong, and Ness. This fleet included four vessels converted in Norway, the *Royal Sea*, *Snow King*, *Royal King,* and *Royal Princess*, as well as the *Aleutian Speedwell*, which had been converted in the United States. Their names were changed to the *Katie Ann*, *Elizabeth Ann*, *Rebecca Ann*, *Victoria Ann*, and *Christina Ann*. In 1997, American Seafoods also purchased three of the Emerald Seafoods vessels, the *Claymore Sea*, *Heather Sea,* and *Saga Sea*. With these purchases, American Seafoods controlled a fleet of nineteen factory trawlers, sixteen of which were then operating in the U.S. E.E.Z. and represented over half of the factory-trawler capacity in the pollock fishery.

Along with the consolidation in the U.S. fishery, several vessels were sold to companies operating outside the Alaska fisheries. Some of these vessels were sold to Russian companies. One was the *Arctic Trawler*, the first U.S.-owned factory trawler used in the Bering Sea for groundfish. Tyson also sold a factory trawler to Russia. In addition, Emerald Seafoods sold three vessels to a Russian enterprise that was unable to meet its payment obligations; the vessels were later bought out of bankruptcy by American Seafoods (Plesha 1997).

According to Røkke, these investments were part of calculated strategy which he felt would give him an edge. First, Røkke continued to hope for the eventual implementation of an ITQ-management system. He felt that controlling a large fleet of factory trawlers would give him a strong position to persuade policy makers to allow implementation of an ITQ program. Second, a large fleet would give him control over a large portion of the quota. That would guarantee that he would be richly rewarded in quota share. Lastly, he felt it would enable American Seafoods to surrender vessels in give-and-take negotiations on an ITQ system. He was guessing that if legislation was passed, there would be some type of buyback provision to reduce excess capacity, and he would be able to sell the least-efficient vessels in his fleet while retaining their catch history for use by his most efficient vessels (Hornnes 2006).

Introduction of Inshore/Offshore III

With the continued bankruptcies within the factory trawler fleet, and the continued rise of American Seafoods, talk at the Council level focused on reduction of fleet capacity and rationalization plans. Paul MacGregor, an attorney representing the factory trawlers testified at a 1997 meeting:

> …boats don't go away. People buy'em and the people that buy them are the ones…that are the more successful companies. As companies have gone bankrupt in the offshore fleet, a number of companies have picked them up. So you have today a fleet that's pretty much the same size as it was back in 1990, there have been a few vessels sold to Russia, but absent those your fleet is more or less the same size. (Plesha 1997)

Testimony for the at-sea sector continued to focus on some type of fleet reduction plan or rationalization plan, since sector allocations had only hurt and decreased the stability of the at-sea sector (Plesha 1997).

Still, attempts at rationalization stalled, and the Council prepared to revisit the inshore/offshore sector allocations for the third time. At their April 1997 meeting, the Council acknowledged that a comprehensive rationalization plan to address overcapitalization and preemption issues could not be adopted and implemented prior to the expiration of Inshore/Offshore II. The Council began development of a third set of inshore/offshore FMP amendments. In June 1997, the Council requested information in the form of pollock-industry profiles that enabled it to examine the evolution and current status of the BSAI pollock fisheries from 1991 through 1996, and at its September 1997 meeting, after examination of the industry profiles, consideration of public comment, and Council discussion, the Council adopted a complex set of inshore/offshore alternatives for analysis (NPFMC 1998).

Over the course of the next several Council meetings, these inshore/offshore alternatives evolved into five basic alternatives and included various sub-options within each alternative. At the June 1998 meeting, the preferred alternative was similar to the Inshore/Offshore II with a couple of modifications: (1) 4% of the BSAI pollock TAC, after subtraction of reserves, would be shifted to the inshore sector resulting in a 39/61 inshore/offshore allocation split; (2) a portion of the inshore Bering Sea B-season allocation, equal to 2.5% of the BSAI pollock TAC after subtraction of reserves, would be set aside for small catcher vessels, and would become available on or about August 25 of each year to other vessels; and (3) catcher vessels delivering to the offshore sector would be prohibited from fishing inside the CVOA during the B season from September 1 until the inshore sector B-season allocation was closed to directed fishing. Amendment 51 would remain in effect for the years 1999 through 2001 (NPFMC 1998).

Cooperatives

During 1998, while the Council was discussing Inshore/Offshore III, factory trawler companies began building support for an alternative approach to rationalize the pollock fishery: harvesting cooperatives, similar to that created in the Pacific whiting (*Merluccius productus*) fishery off the coast of Washington in 1997. The whiting cooperative provided fishermen with an opportunity to enjoy the benefits of individual catch shares while legally circumventing the moratorium on new IFQ programs (PFMC 1993; Sylvia and Larkin 1995; Freese et al. 1995; Larkin 1998; Townsend 2005).

The Pacific whiting fishery and the pollock fishery shared key similarities. They had a similar industrial organization with inshore and offshore sectors consisting of factory trawlers, motherships, shore-based processors, and catcher boats, with nearly all of the catch being processed into surimi (Hastie et al. 1991; Radtke 1991; Dorn et al. 1993; Larkin and Sylvia 2000). Like the pollock fishery, the Pacific whiting fishery had been managed with sector allocations, with a preference given to the inshore sector. Within each sector, vessels raced for fish, leading to compressed seasons, reduced product quality and reduced product recovery (PFMC 1993; PFMC 1995; PFMC 1997). Similarities between the pollock and Pacific whiting fisheries also extended into capital ownership. For example, the ten factory trawlers involved in the Pacific whiting fishery were owned by four companies that also participated in the pollock fishery: American Seafoods, Tyson, Glacier Seafoods, and Alaska Ocean.

With the intent of ending the race-for-fish and securing their portion of the whiting TAC, the four companies lobbied for authority to form a harvesting cooperative. The idea was to combine features of the enterprise allocation system utilized in the Atlantic cod fishery of the east coast of Canada with provisions of the Fisherman's Cooperative Marketing Act of 1934 which provides limited antitrust exemptions for the fishing industry. In 1982 to respond to gear conflicts and battles between inshore and offshore sectors, Canada designed and implemented a management structure that allocated a percentage of the TAC to each sector, and within the offshore sector, the TAC was further subdivided into three portions. This guaranteed, though only on a year-to-year basis, individual portions of the offshore TAC to the two largest companies that typically accounted for over 80% of the offshore allocation. The remaining quota was granted to a group of independent fishermen, who fished in a typical race-for-fish. Although the inshore fishermen, who weren't granted any individual rights to the TAC, and the independent offshore fishermen, who continued to increase vessel size and capacity, failed to realize gains, the two large offshore companies were able to reduce their fleet size and increase their efficiency (Gardner 1988; Binkley 1989; PFMC 1993).

The Fisherman's Cooperative Marketing Act of 1934 was intended to allow groups of "small" producers to form cooperatives to jointly market their products. Because the offshore whiting companies interested in forming a cooperative were large integrated companies, there was concern that the proposed cooperative would be found to violate U.S. antitrust law. Much of this concern came from Tyson's prior experience with antitrust issues in the poultry industry. Therefore the whiting industry spent considerable time consulting with the Anti-Trust Division of the U.S. Department of Justice, in order to obtain a ruling on the legality of the organizations (PFMC 1993; J. Plesha, Personal communication; Pacific Whiting Conservation Cooperative 2010).

On 27 May 1997, the Department of Justice accepted the argument that a harvesting cooperative would be pro-competitive, and permitted the formation of the cooperatives (Klein 1997). After receiving the favorable ruling through a Business Review Letter by the Department of Justice, the four companies took a single afternoon to split the sector allocation into individual company allocations. The whiting cooperative fulfilled three primary functions for the companies: it allocated quota shares of whiting and subdivided sideboard constraints; it facilitated bycatch avoidance; and it provided for monitoring of compliance and enforcement of the contractually allocated shares of the sector allocation. Of these, the foremost advantage was the authority to contractually sub-allocate quota within each sector and within each cooperative (multiple cooperatives could be formed within a sector). The contractual sub-allocations are based on membership agreements negotiated among the cooperative members. Participation was voluntary and governed by civil contract. In practice, the cooperative system is similar to an ITQ system. However, beyond deciding on the allocation of harvesting privileges, cooperative members also decide on rules for trading or selling their allocations as well as penalties for violating contractual agreements (Sylvia and Larkin 1995; Criddle and Macinko 2000; Sullivan 2000; Anderson 2002; Pacific Whiting Conservation Cooperative 2010).

The four offshore whiting companies saw immediate results. With suspension of the race-for-fish, they immediately reduced the number of vessels in the fishery. Product recovery rates increased from 17.2% to 20.6%; a 20% increase in product with no increase in catch. Bycatch rates also declined as vessel operators had more flexibility to shift to fishing grounds with lower bycatch rates. In addition, the cooperative members agreed to maintain full-time observer coverage, report their catches to a third party service, and to pay penalties to each other if they exceeded their shares. The cooperative was self-regulating, and enjoyed increased profits from eliminating the race-for-fish (Sylvia and Enriquez 1994; Sylvia et al. 2008; Pacific Whiting Conservation Cooperative 2010).

Success of the Pacific whiting cooperative led the companies to anticipate similar benefits in the pollock fishery. Moreover, many of the same companies had already experienced similar benefits from the CDQ shares they had leased. The 7.5% pollock allocation given to the CDQ program under Inshore/Offshore I and continued under Inshore/Offshore II had been sub-allocated to six CDQ entities, which represented more than 50 western Alaska communities. Because the CDQ entities did not have the vessel capacity or port infrastructure to harvest pollock, they leased their sub-allocations based on bids that included royalty payments, offers of employment for community members, and investment opportunities. While the Inshore/Offshore I regulatory impact review anticipated that the CDQ share would "accrue to the inshore sector," the opposite occurred (NPFMC 1992; NPFMC 1995a). Shore-based processors including Westward and Trident tried to compete for the CDQ share, but they were unwilling to pay as much as the factory trawlers were willing to pay. For instance, while Trident was able to lease quota from the Aleutian Pribilof Island Community Development Association (APICDA) in 1993 and 1994, it ended up sub-leasing the quota to American Seafoods and buying the fillets back after the CDQ pollock had been harvested and processed. Over time, a majority of the CDQ pollock has been leased and fished by factory trawlers, who were able to process the fish more effectively and extract higher value from the product and offer higher royalty payments (NPFMC 1992).

Fishing CDQ shares yielded exciting results for the factory trawler companies. Because the CDQ quota provided exclusive harvest rights, fishing companies did not need to race each other when they fished their CDQ quotas. This gave operators greater flexibility to choose when, where, and how to fish; decisions could be based on maximizing profit per pound of CDQ instead of maximizing catch-per-day as they did in the regular fishery. Companies could participate in the race-for-fish during the A season, then after the quota for that season was exhausted, fish for their CDQ pollock at a pace and in a manner that allowed them to capture more value from the fish. For example, in 1994, high-value fillets represented 26.1% of the product mix for factory trawlers during the race-for-fish and 39.6% when they fished their CDQ quota. In addition, the overall product utilization rate jumped from 14.3% to 16.7% when fishing switched from the ‘open’ season to the CDQ shares. The increased efficiency gave the factory trawlers a glimpse of the benefits that could be obtained from rationalization (NPFMC 1998).

With the success seen in CDQ shares and in the whiting cooperative, factory trawlers tried to introduce the idea of cooperatives late into the 1998 Council debate over Inshore/Offshore III. American Seafoods pushed the idea forcefully, with other factory trawler companies in support. However, in order to facilitate formation of a cooperative, the at-sea sector needed separate allocations to the factory trawl sector and the mothership sector. To gain the inshore sector’s support for the allocation, representatives from the factory trawlers agreed with inshore representatives to shift 4% from the offshore quota to the inshore sector, anticipating that gains from being able to form a cooperative would more than offset the reduced sector allocation (NPFMC 1998).

Council discussion at the June 1998 NPFMC meeting focused on a last minute proposal to establish a three way sector allocation: 40% inshore, 50.5% offshore, and 9.5% to “true” motherships. This is the first time the idea of cooperatives was publically discussed with the three-sector allocations. There was much debate over the three-sector allocation, and according to participants, an agreement was almost reached through the Council process. Nevertheless, the three-sector allocation did not go through because motherships did not see how it would advantage them. Their historic portion of the catch had represented between 8.5% and 11.5% of the TAC and they felt there was no advantage to agreeing to the split (NPFMC 1998).

With disagreement among participants, the Council refused to pass the three-sector split. One Council member indicated that he felt the Pacific Fishery Management Council (PFMC), which managed the whiting fishery, was unaware that the industry intended to form a cooperative in the whiting fishery when they passed a three-sector allocation. Given his knowledge of the industry's intent to form a cooperative, he would not support a three-sector split. Other members also felt uncomfortable with the short time they were given to consider the impacts of a cooperative, and there were complaints that those affected had not been given time to comment on the cooperative idea. There was also some concern whether cooperatives were too much like an IFQ and would be disallowed on Secretarial review due to the MSFCMA-imposed moratorium on new IFQ programs (NPFMC 1998).

According to Plesha, the cooperatives were not discussed until that June 1998 meeting (J. Plesha, personal communication). Even with the offer for an increased portion of the quota share to the inshore sector, the short time frame may have prompted some concern from some shore-based processors who were worried about competing with an at-sea cooperative. There were additional concerns regarding potential spillover effects on other fisheries. If, as expected, formation of cooperatives would lead the factory trawler companies to using fewer vessels in the pollock fishery, would the liberated capacity spill into fisheries such as salmon and flatfish, and create increased competition for shore-based processors in those fisheries? This concern may have also influenced the Council (NPFMC 1998).

The Council instead passed BSAI Amendment 51, or Inshore/Offshore III, which allocated 61% of the BSAI pollock TAC to the at-sea sector (after subtraction of reserves and a 10% CDQ allocation) and 39% to the inshore sector, with the motherships still contained within the at-sea sector. The factory trawler companies felt betrayed. They had agreed to the 4% increase in the inshore allocation in exchange for support of the three-sector split and the ability to form cooperative. Instead, they simply received a smaller share of the TAC. The amendment was then sent to the Secretary of Commerce for implementation in the 1999 fishing season (NPFMC 1998).

American Fisheries Act

While the Inshore/Offshore allocation debate at the NPFMC remained the primary focus of the pollock fishery in the 1990s, opposition to foreign ownership of vessels also remained an important theme. The court ruling in 1992, supporting the USCG's interpretation of the Anti-Flagging Act, did nothing to curb foreign ownership in the pollock fishery and it had allowed the rebuilt factory trawlers a fishery endorsement. While fighting over sector allocations at the Council level, Tyson and Trident continued to argue for an interpretation of the Anti-Reflagging Act that would benefit them by reducing capacity in the pollock fishery through the reduction of foreign ownership and foreign rebuilt vessels. American Seafoods, which continued to grow, was owned by Røkke, a Norwegian national; by 1998, American Seafoods owned nearly all the Norwegian rebuilt vessels in the pollock fishery. Thus Trident and Tyson felt that if they could have a new congressional act introduced to implement policies that reflected their view of the original intent of the Anti Flagging Act, their number one competitor would be largely eliminated and their share of the pollock fishery would be increased (J. Plesha, personal communication).

After researching what rules would be required to truly end foreign ownership and the use of foreign rebuilt vessels in the EEZ fisheries, Trident and Tyson worked with Senator Stevens to introduce a new bill to Congress; on 25 September 1997, Stevens introduced the American Fisheries Act (U.S. Public Law 105-277). As initially written, the American Fisheries Act (AFA) would have stripped fisheries endorsements from numerous factory trawlers rebuilt in foreign shipyards under the Anti-Reflagging Act savings exemptions, established a 165 ft limit on U.S. fishing vessels, and would have limited foreign ownership in U.S. fishing vessels to 25% (NPFMC 2002). As drafted, the AFA would have primarily affected American Seafoods, but would have also affected *Arctic Storm*, which had Korean owners, and *Alaska Ocean*, which had Japanese owners. In addition, the AFA would have removed fisheries endorsements from most of the factory trawl fleet which had benefited from rebuilds in Norway and Korea (Hornnes 2006). Surprisingly, the bill contained special exclusions for the mothership sector, which included vessels that had undergone substantial rebuilding in foreign shipyards and contained substantial foreign investment (Myhre 1998). In addition, the original draft of the AFA would have had no impact on foreign ownership of shore-based fish processors.

Naturally, opposition came from all affected owners. Bill Myhre, the attorney who had assisted the Norwegian investors in securing fishery endorsements for their converted vessels, wrote "History of the Anti Reflagging Act — the real story" to confront the threats posed by the AFA. First of all, AFA supporters claimed that the U.S. Coast Guard had allowed more vessels to be rebuilt overseas than Congress intended. Second, they claimed that vessels had been rebuilt larger than Congress had anticipated. Third, they argued that the U.S. Coast Guard had misinterpreted the law. Myhre defended against these assertions by presenting evidence that Congress knew precisely how many vessels had received rulings from the U.S. Coast Guard, guaranteeing that they would not lose the fishery endorsement after conversion, and that the amount of rebuilding would be significant. He argued that many Congressmen were still concerned about attracting foreign capital as the Anti Reflagging Act was debated, and thus had consciously allowed all the foreign rebuilt factory trawlers to enter the U.S. EEZ (Myhre 1998; Hornnes 2006).

The AFA was met with additional opposition on a variety of fronts. A letter from Attorney General John Ashcroft to Congress stated that passage of the AFA would be an unconstitutional violation of the Takings Clause because it would invalidate the factory trawler's fishing endorsements (Myhre 1998). Because the factory trawlers were primarily based out of Seattle, they appealed to Washington Senator Gorton for help in opposing the proposed AFA. He was able to stall the Act in committee. Senator Stevens then tried to add an amendment to the Commerce, Justice, State Appropriation Bill, which would have shifted 5% of the annual pollock TAC from the at-sea sector to the inshore sector and would have required that all fishing vessels be 75% U.S. owned or controlled. With objections from Washington Senator Gorton, the amendment was withdrawn (J. Plesha, personal communication).

With their recent failure at introducing cooperatives through the Council process, the factory trawler fleet, with American Seafoods leading the charge, took their cause to the Congress as well. On 20 July 1998, a little over a month after they had been denied by the NPFMC, American Seafoods attempted to combine the fights over the AFA and cooperatives by introducing a draft bill to a well-attended meeting held in the Senate Commerce Committee's hearing room. Various industry representatives from the At-Sea Processors Association, Pacific Seafood Processors Association, United Catcher Boats, American Fisheries Act Coalition, and Greenpeace filled the room with congressional staffers in an effort to reach a compromise on the AFA. Two bills were proposed, one from American Seafoods, and an alternative from the Norton Sound Economic Development Corporation (NSEDC), a western Alaskan CDQ group. American Seafoods proposed a structure similar to what they proposed in Inshore/Offshore III, with the addition of limiting new participants in the C/P sector. NSEDC proposed a structure similar to that passed in the Inshore/Offshore III, but with a subdivision of the offshore allocation into separate sector allocations for factory trawlers and motherships. In addition, NSEDC proposed a further increase in the CDQ allocation from 10% to 12.5% of the TAC. While participants aggressively defended their respective positions, no agreement was reached (J. Plesha, personal communication).

Two days later, Senator Gorton sat down with a small group of AFA supporters and said he wanted to see a compromise bill passed by the end of the year. The Senator's position was that then current participants in the inshore and at-sea sectors should be recognized as legal participants, including both the foreign owned and rebuilt fleet. He felt that the North Pacific was overcapitalized and that legislation should be passed to reduce the excess capacity by reducing the number of factory trawlers, thereby eliminating the race-for-fish. Attendees were told he would schedule a meeting for 18 August 1998 when he would invite members of the industry to discuss their plan. Senator Gorton informed participants of five issues he wanted addressed in a proposed plan: Americanization; decapitalization; compensation; reallocation; and rationalization. He emphasized that if the involved parties were not able to reach a compromise soon, no Act would be passed (J. Plesha, personal communication).

Although the benefits of a compromise plan were more than enough to motivate involved parties, American Seafoods received an additional incentive that made them even more inclined to negotiate. Before the original introduction of the AFA, Plesha had been researching vessels that had been granted fisheries endorsements under the grandfather clause of the Anti-Reflagging Act; and more specifically, he looked into the clause allowing foreign rebuilding as long as the contract to rebuild had been entered into prior to a specified date. Under a Freedom of Information Act request, he was able to obtain all the background materials for the ruling letters that the U.S.C.G. had issued allowing the foreign rebuild. While examining the paperwork, Plesha became suspicious of the documentation of three vessels, including the *Acona*. The *Acona* had been a 40 year old, 85 foot research vessel, which had been rebuilt in Norway for American Seafoods. The entirely rebuilt vessel, which was completed in 1990 and renamed the *American Triumph*, had the largest throughput capacity in the factory trawler fleet. Plesha noticed the contract for the *Acona* appeared backdated, so he sought out the other party on the contract and was able to obtain an affidavit attesting that the backdating had taken place in order to qualify it under the grandfather clause. The information was provided to the U.S.C.G., who initiated an investigation into the issue, and notified American Seafoods of their findings on 3 September 1998. The letter announced the U.S.C.G. was going "to invalidate documentation for the fishing vessel *American Triumph*," effective in 30 days. Myhre, representing American Seafoods, suspects that the ruling would have been overturned in court, as there were agreements in place before the cut-off date established in the Anti-Flagging Act. Still, the potential loss of endorsements for one of its most advanced and important vessels, which was responsible for catching and processing nearly 3% of the total pollock TAC, was something that American Seafoods did not want and could be expected to defend by offering concessions on other aspects of the AFA.

The plan introduced by the AFA coalition at the 18 August 1998 meeting still would have revoked the fishery endorsements of 18 factory trawlers. Seeking some type of compromise, Senator Gorton and his staff continued to meet with other industry participants over the next few weeks to discuss issues related to the plan. The stage was then set for a more formal meeting in Washington, D.C. on 9-11 September 1998 in the Senate Appropriations Committee hearing room, which was chaired initially by Senator Stevens, and later by his staff member, Trevor McCabe. Senator Stevens expressed his positions, which focused on the same issues as Senator Gorton, namely that the bill require:

1. a 75% minimum level for U.S. ownership and control of vessels with endorsements to fish in the U.S. EEZ;
2. removal of the *American Triumph* and several other factory trawlers accompanied with a $40 million buyout of additional factory trawlers, with the Federal government and industry splitting the bill;
3. anti-trust exemptions for sector cooperatives, including cooperatives composed of processors and catcher vessels; and,
4. reallocation of the Bering Sea pollock fishery, with 10% “off the top” for CDQ and 50% for “onshore processors.” (Joe Plesha, personal communication)

With Senator Steven’s and Senator Gorton’s expectations laid out, the pollock industry had the outlines for framing a revised draft of the AFA (Joe Plesha, personal communication).

The first three days of negotiations focused on the primary components of the AFA, as well as the details of the buyout. It was agreed that the shift of 10% of the directed pollock TAC from the offshore sector to the inshore sector would be accomplished by using the buyout to compensate owners of factory trawlers for the catch history of vessels they agreed to remove from the fishery. Although the vessel buyout option was available for most factory trawlers, Stevens told industry that buyouts of the *Highland Light*, *Starbound* and Tyson vessels would not be allowed, as they were “American” boats. With owners of the *Arctic Storm* and *Arctic Fjord* uninterested in the buyout, the only vessels that could be considered were the *Alaska Ocean*, *Endurance* and American Seafoods’ factory trawlers. As the primary target of the legislation and with the largest fleet, American Seafoods negotiated the buyout of nine of their vessels. In addition, they agreed not to reflag the three Emerald Seafoods factory trawlers American had purchased in 1997, which had spent 1996 fishing in the Russian EEZ. In exchange, it was agreed that the *American Triumph*, would retain its fishery endorsement (Hornnes 2006; J. Plesha, personal communication).

The negotiators met again on 17-18 September 1998 to finalize some of the details, with a focus on the structure of the fishery cooperatives and protections for non-pollock fisheries in the BSAI and GOA. The concern was that a rationalized pollock fishery would free-up capacity which could be used to exploit other fishery resources. Crab processors voiced strong concern that surplus pollock processing capacity would be diverted to crab processing. Flatfish trawlers expressed concern that spillover of surplus capacity in the at-sea pollock fleet would exacerbate the already overcapitalized flatfish fisheries. In response to these concerns, sideboard regulations were added to the AFA. AFA-qualified factory trawlers were to be limited to catches of non-pollock species based on their past catch history; sideboard limits for the inshore sector and for motherships would be set at a later date by NPFMC and NMFS. For example, pollock processors were enjoined from processing more crab than their 1995-1997 average (J. Plesha, personal communication; NMFS 2002).

On the day the bill was to be finalized, NMFS proposed modifying the bill to require scrapping of the nine factory trawlers American Seafoods had agreed to remove from the pollock fishery so that the U.S. would not be perceived to be subsidizing the expansion of a distant water fleet. In the end, with additional compensation offered, American Seafoods agreed to scrap eight vessels. The *American Empress* was exempted from the scrapping requirement and was subsequently sold to another company owned by Røkke and used to fish off the coast of South America (Hornnes 2006).

The State Department interjected after the deal was complete and insisted on grandfather clauses that would take into consideration bilateral treaties with foreign countries. This took into consideration investments made under prior laws. With the last issues resolved, the finalized draft SB1221 reached the Senate Appropriations Committee for inclusion with the omnibus appropriations package on 7 October 1998, and was subsequently passed by Congress on 21 October 1998.

Tyson, who owned several factory trawlers, was losing money on their seafood line. Selling their fishery assets in an overcapitalized open access fishery would have generated very little return on investment. Tyson saw the AFA as an opportunity to recapture a larger share of their initial investment when it was time to sell and Tyson's close political connections to the Clinton administration meant that they wielded influence in shaping the AFA (Bernton 1992; Ota and Hamilton 1993). Tyson ultimately agreed to give up 0.5% of the catch share history of their vessels in exchange for $5 million dollars of AFA money. This allowed the AFA drafters to increase the mothership sector's allocation to 10%. With Tyson's backing, there was confidence that, despite objections by NMFS, the bill would not be vetoed when submitted to the White House (J. Plesha, personal communication; Bernton 1992).

Summary of the American Fisheries Act

Congress intended the AFA to accomplish two primary goals. First, it was to complete the process of Americanization of the pollock fishery. Second, it was to end the race-for-fish and overcapitalization of the fishery.

Americanization of the U.S. fleet was assured through new regulation. There was a prohibition on the entry of any new fishing vessels that exceeded 165 ft. registered length, 750 gross registered tons, or 3,000 shaft horsepower. The length limitations ensured that no new factory trawlers would enter the U.S. EEZ pollock fishery, thereby satisfying legislative objectives of Greenpeace and other environmental groups. The limits on horsepower were designed to limit the size net that catcher vessels could tow, setting an effective upper limit on the size of catcher vessels operating in the inshore and mothership sectors. The second, and more sweeping requirement, was that ownership of all U.S.-flagged fishing vessels had to comply with a 75% U.S. controlling interest standard (NMFS 2002).

In order to decapitalize the pollock fishery, the AFA established a buyout program that removed 10% of the at-sea production through a combination of $20 million in federal appropriations and $75 million in direct loan obligations. The direct loan obligations were to be paid for by a fee of six-tenths of one cent ($0.006) for each pound round weight of pollock harvested by catcher vessels delivering to inshore processors. In addition to removing capacity, the AFA listed, by name, vessels and processors and/or provided qualifying criteria for those vessels and processors eligible to participate in the non-CDQ portion of the BSAI pollock fishery. This created a prohibition on the entry of new vessels and processors into the BSAI pollock fishery (NMFS 2002).

With the removal of harvesting and processing capacity, the next step was to introduce a management structure that would end the race-for-fish among the remaining participants. This was accomplished by allowing for the formation of cooperatives. The AFA also included a new allocation scheme for BSAI pollock. After NMFS and the NPFMC determine the pollock TAC, the allowance for the CDQ program is set aside as the CDQ reserves. The AFA raised this allocation from 7.5% to 10% of the BSAI pollock TAC. The remaining allocation forms the initial TAC (ITAC), from which an incidental catch allowance (ICA) is set aside to account for bycatch of pollock in other fisheries. This number was originally set at about 4.5% of the TAC, but was reduced in subsequent years to about 3% as a consequence of improved management precision in other fisheries. The remaining TAC, the directed pollock allocation (DPA), was split: 50% to the inshore sector; 40% to vessels harvesting pollock for processing by catcher/processors[2]; and, 10% to vessels harvesting pollock for processing by motherships. These permanent allocations provide stability for the pollock fishery, although the actual harvest allocations can vary depending on variations in the abundance of pollock as reflected in variations in the annual TAC (Figure 1.6).

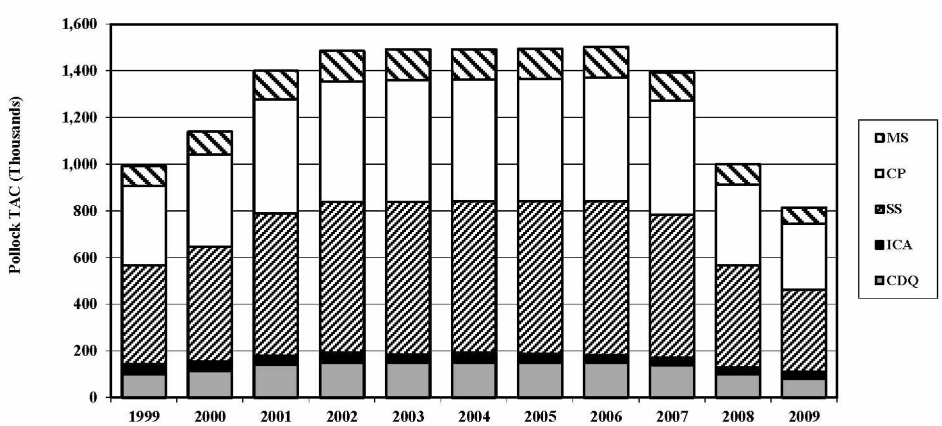

Figure 1.6. Pollock allocations between sectors.
Source: NMFS (2010).

[2] The AFA refers to factory trawlers as catcher/processors. This can be confusing because, in general usage, the term catcher/processor includes pot and longline vessels that process catches. Nevertheless, through the balance of this document, catcher/processor will be used to denote AFA-qualified factory trawlers.

With the three-sector allocation in place, the stage was set for cooperatives to be formed. The AFA set standards and limitations for the creation of fishery cooperatives in the catcher/processor, mothership, and inshore sectors. The AFA-qualified factory trawlers were allowed to form cooperatives much as they had in the Pacific whiting fishery. The inshore sector was allowed to form cooperatives under a quasi-IFQ program wherein NMFS grants allocations of the inshore BSAI pollock TAC to inshore catcher vessel cooperatives in proportion to the catch history contributed by vessels within the cooperative with the proviso that they agree to deliver at least 90% of their pollock catch to that processor. The contentious tying of vessels to a specific processor "is intended to promote win-win rationalization in both the overcapitalized harvesting and processing sectors" (Matulich et al. 2001). The cooperatives are also subject to annual reporting requirements. The AFA-qualified factory trawlers formed a cooperative in 1999; inshore and mothership cooperatives formed in 2000.

In order to limit concentration of ownership, an excessive share harvesting cap of 17.5% was set for pollock in the at-sea sector. The AFA also required the NPFMC to develop "management measures to prevent any particular individual or entity from processing an excessive share of the pollock", presumably through a share cap, which was later determined to be 30%.

The AFA also mandated increased observer coverage and onboard scales to weigh catches aboard AFA-qualified factory trawlers. All AFA-qualified factory trawlers are required to carry 200% observer coverage which means that vessels carry two observers on board whenever they are harvesting and processing fish.

Cooperatives and Fishery Sectors

The AFA establishment of a three-sector allocation was important for the pollock fishery. Between 1992 and 1998, the inshore/offshore allocations had been established through the NPFMC, and it was a constant battle over how much fish each sector was going to receive. Setting the new allocations through Congressional action ensured that the allocations to all involved parties would remain unchanged without another act of Congress. This gave the industry a new level of stability, as they could now turn their focus from lobbying the NPFMC for favorable allocations and instead focus on maximizing the value of their catches.

The cooperatives that developed within the three sectors were the most important benefit of the AFA. Cooperatives in the pollock fishery allow both leasing and selling of fishing privileges among cooperative members. The leasing and sale of harvesting privileges to outside parties is allowed only if the buyer agrees to abide by the rules set forth in the cooperative contract and are part of the sector to which the harvesting privileges were allocated. For example, a vessel in the inshore sector can lease catch shares to members of its own cooperative or to an outsider that operates within the inshore sector but cannot lease catch shares to vessels operating in the mothership or catcher/processor sectors. The buyer must also harvest and process the quota with one of the vessels already permitted, or a replacement vessel that meets specific criteria. The cooperatives' membership agreements provide for contractual remedies to enforce sanctions should a member exceed the quota allocated to them. Cooperatives establish sideboard restrictions which can be traded among cooperative participants and between the different cooperatives (NPFMC 2002; Fell 2008). In addition, all cooperatives formed under the AFA were given antitrust exemptions from the Department of Justice (Klein 2000(a-g))

Catcher/Processor Sector

Under the AFA, the pollock catcher/processor sector consisted of 20 vessels, a substantial reduction from the 29 catcher/processors who had targeted pollock in 1998, and much lower than the 54 operating in 1991. These vessels were specifically named in the AFA as the only factory trawlers allowed to operate in the fishery, and no replacement vessels could be used except in case of loss where:

> … such loss was caused by an act of God, an act of war, a collision, an act or omission of a party other than the owner or agent of the vessel, or any other event not caused by the willful misconduct of the owner or agent. (AFA 1998)

The sector was allocated 40% of the DPA, 8.5% of which (3.4% of the DPA) was allocated to the seven (high seas) catcher vessels that had qualified catch history from delivering to factory trawlers, leaving 36.6% of the DPA for the AFA-qualified factory trawlers. After harvesting nearly 50% of the total TAC in 1998, the reduction to 34% in 1999 represented a 32% loss of pollock to the catcher/processors, leaving the sector with the largest reduction in TAC from the AFA (Figure 1.7; Figure 1.8).

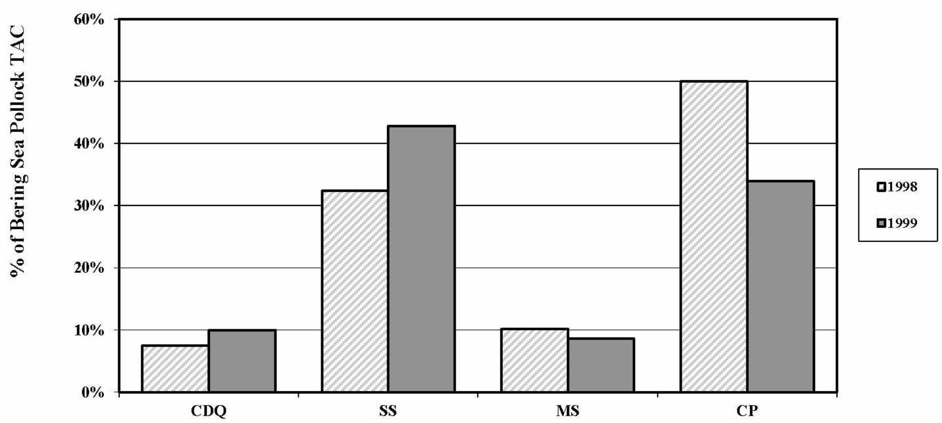

Figure 1.7. Percentage of pollock TAC allocated to each sector in 1998 and 1999. Source: NMFS (2002).

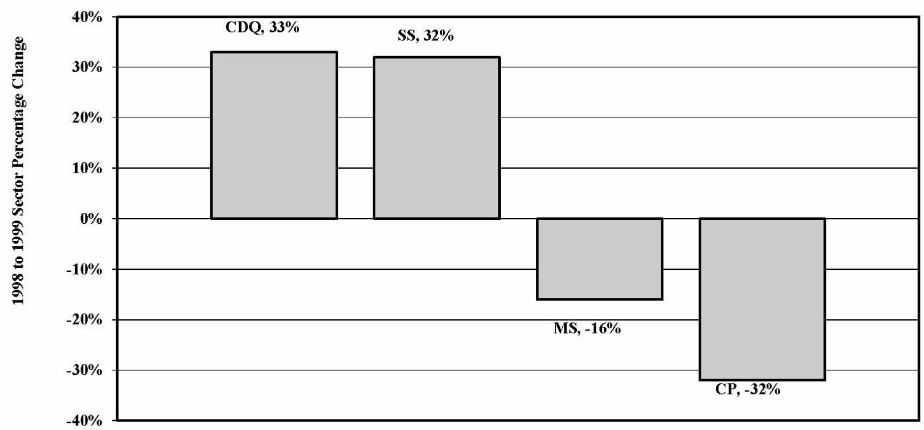

Figure 1.8. Change in percentage of pollock TAC allocated to each sector from 1998 to 1999.
Source: NMFS (2002).

Although the catcher/processor sector suffered a large reduction in the DPA, they benefited from the increased CDQ allocation. Catcher/processors have harvested a majority of the CDQ pollock allocations since the program was introduced in 1992. As a result, they captured 45.6% of the DPA and CDQ pollock harvested between 1999-2009, which compares to the 44.4% captured by the inshore sector over the same period (Figure 1.9). Over this time period, it has meant that catcher/processor harvests have fluctuated from a high of over 694,000 mt in 2003 to a low of just over 351,000 mt (Figure 1.10).

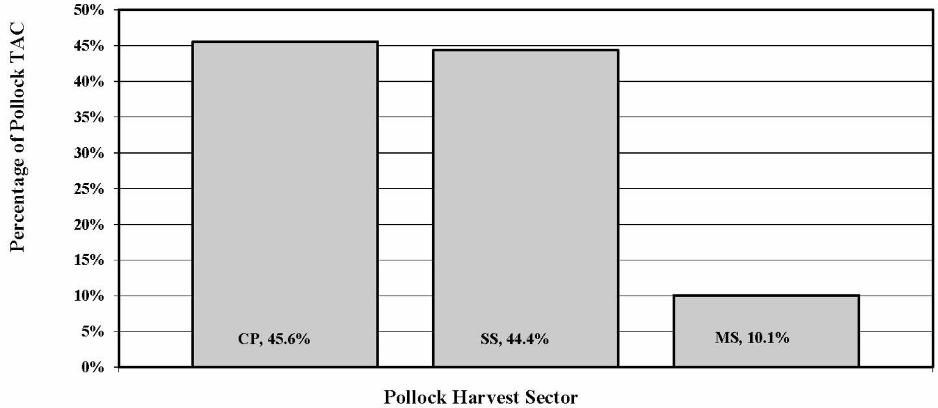

Figure 1.9. Sector harvest percentage of BSAI DPA and CDQ pollock catches, 1999-2009[3].
Source: J. Ianelli, personal communication; NMFS (2010).

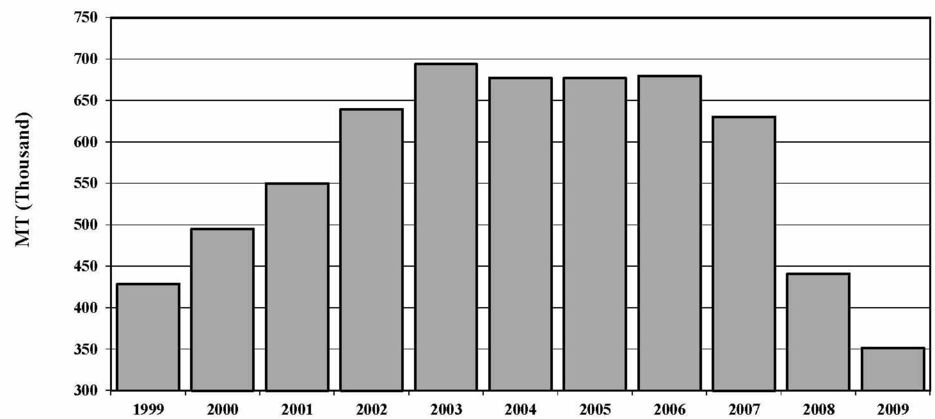

Figure 1.10. Catcher/processor pollock harvests, CDQ included, 1999 to 2009[4].
Source: NMFS (2010).

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[3] 2001- 2009 landings data was provided by Jim Ianelli of NOAA. Due to changes in reporting system, 1999 and 2000 data is from NOAA catch reports. For these years, it is assumed that 90% of the CDQ allocation was harvested by the catcher/processor sector and 10% was harvested by the mothership sector.

[4] See footnote 2

Under the AFA, the catcher/processor sector was allowed to form either a single cooperative that includes both catcher/processors and catcher vessels delivering to catcher/processors, or catcher/processors and catcher vessels could form separate cooperatives and enter into an inter-cooperative agreement. The later structure was adopted. The Pollock Conservation Cooperative (PCC) was formed on 18 December 1998, two months after the passage of the AFA and in time for the 1999 fishing year. Also in time for the 1999 season, the seven high seas catcher vessels organized the High Seas Catchers' Cooperative (HSCC), with authority to lease or sell quota to AFA-qualified factory trawlers. Because it was more profitable to lease or sell quota than to harvest the fish themselves, most members of the HSCC leased or sold their quota to the PCC and its members. After passage of the AFA, the HSCC members were being offered approximately $300 per metric ton for leased quota shares, a sharp increase from the 1998 price of approximately $132 per metric ton of delivered catch. Not only did leasing generate higher revenues, but those revenues could be had without the cost of fishing. Consequently, HSCC members harvested less than 30% of their own catch allocation in 1999 and entirely ceased pollock fishing within a couple of years. It was not until 2008 that any HSCC vessel again fished its quota and then it was not because it was more profitable. Instead, American Seafoods needed another vessel to harvest their quota so they didn't exceed the 17.5% harvesting cap (NMFS 2002; J. Jacobs, personal communication).

There were two types of factory trawlers operating in the at-sea sector at the introduction of the AFA: surimi and fillet. Surimi factory trawlers were equipped to process surimi, fillet, roe, fishmeal and other products. The fillet factory trawlers could also produce roe and fishmeal but lacked the capacity to produce surimi. Fillet factory trawlers generally searched for larger fish, because small fish could only be used for the low value fishmeal or mince. Surimi factory trawlers had the option of using small fish for surimi. Although surimi was not normally as valuable as fillet, it was worth significantly more than fishmeal or mince and it was easier and cheaper to find large schools of small fish. Some factory trawlers can harvest and process over 400 mt of fish per day, yielding over 100 mt of frozen product. With freezer hold capacity of as much as 1,500 mt, they can stay on the grounds for a couple of weeks at a time. The ability of the surimi factory trawlers to adapt to different size fish and market conditions gave them a significant advantage over fillet factory trawlers. As a result, under the race-for-fish leading up to the AFA, fillet factory trawler production peaked at 467,323 mt of groundfish in 1991 and declined monotonically to 90,963 mt in 1999.

Due to their operational disadvantages eight of the nine vessels scrapped by American Seafoods in concert with AFA implementation were fillet factory trawlers. The vessels scrapped were the *Pacific Scout*, *Pacific Explorer*, *Pacific Navigator*, *Victoria Ann*, *Elizabeth Ann*, *Christina Ann*, *Rebecca Ann*, and *Brown's Point*. The ninth vessel, the *American Empress*, was banned from operating in the U.S. EEZ, and was sold to Røkke's Resource Group International (RGI) for use in fishing outside the U.S. For removing these vessels, American Seafoods received $90 million dollars compensation, as well as the money earned from sale of the *American Empress*.

Even with the loss of more than half of their boats, American Seafoods was still the largest company in the catcher/processor sector, owning seven factory trawlers: *American Dynasty*, *Katie Ann*, *American Triumph*, *Northern Eagle*, *Northern Hawk*, *Northern Jaeger*, and *Ocean Rover*. Based on the catch history of these vessels, American Seafoods received 16.0% of the DPA, or 40.0% of the catcher/processor sector allocation. In addition, American Seafoods purchased the fishing rights of two of the HSCC vessels, the *American Challenger* and the *Forum Star*. This additional 0.56% of the DPA gave American Seafoods 16.5% of the DPA, or a total of 41.3% of the catcher/processor sector allocation. While American Seafoods ended up with significantly less catch than before AFA, the $90 million cash compensation eased the loss.

At the time the AFA was passed, American Seafoods was largely owned through Røkke's RGI. Thus with the ownership restriction in the AFA for no more than 25% foreign ownership, American Seafoods faced three options. One option would be to make a formal ownership change under which Røkke's two children, who are U.S. citizens, would be granted shares as advance of inheritance. A second option would have been to apply for an exemption in accordance with the AFA grandfather clause. If grandfathering had been administratively denied, American Seafoods could have fought the denial in court. The third option was to sell out.

Røkke chose to sell off his ownership in American Seafoods and focus his efforts elsewhere. RGI had already begun selling off its holdings in Helly Hansen and Brooks Sports in the late 1990's, which it had acquired in 1993 and 1995. Selling his ownership in American Seafoods would allow Røkke to focus on his new Aker-RGI partnership, which was based closer to Norway. He sold out his shares in 2000, when the largest owner of American Seafood became Centre Partners, with additional investment from Coastal Villages Regional Fund and Central Bering Sea Fishermen's Association, both CDQ entities (American Seafoods Group LLC 2002).

In addition to its seven catcher/processor and two catcher vessels, American Seafoods completed the purchase of the catcher/processor *Highland Light* and catcher vessel *Tracy Anne* in September 2008. The *Highland Light* was part of the Yardarm Knot Group which was established in 1988 by Washington fishermen to harvest and process Alaska crab, salmon, and groundfish. Yardarm Knot took delivery of the *Highland Light* in 1990 from Bender Shipbuilding and Repair Co. of Mobile, Alabama. It was an American company, and before American Seafoods bought it out, the *Highland Light* had received 1.7% of the DPA, or 4.2% of the catcher/processor sector allocation; the *Tracy Anne* had received 0.46% of the DPA, or 1.2% of the catcher/processor sector allocation.

With the gain from further leases obtained through the retirement of the catcher/processor *Endurance*, who sold its share to the PCC in 2000, American Seafoods emerged with control of nearly 19.4% of the DPA, not including leased CDQ shares. This gave American Seafoods ownership over the 17.5% harvesting cap established in the AFA. However, the AFA cap limits the amount of fish a company can harvest, not the amount of quota a company can own. Companies that might otherwise exceed the harvest cap can address the issue a number of ways, which include having independent catcher vessels harvest the quota, leasing the quota to other companies, or swapping directed pollock for CDQ pollock since CDQ pollock doesn't count against the harvesting or processing cap.

The second largest AFA-qualified factory trawler fleet belonged to Tyson, through their subsidy Arctic Alaska, and consisted of five vessels: *American Enterprise*, *Island Enterprise*, *Kodiak Enterprise*, *Seattle Enterprise*, and *US Enterprise*. They were the largest U.S. owned and built fleet in the catcher/processor sector, and had pushed for the AFA with the intent to capitalize on the windfall value of their catch history. Tyson received a 6.6% share of the DPA, or 16.4% of the catcher/processor sector allocation. The DPA that Tyson received was 0.5% less than their historical catch, since they transferred it to the mothership sector in exchange for $5 million as part of the AFA.

Less than a year after AFA took effect, Tyson sold Arctic Alaska. In addition to five AFA-qualified factory trawlers, Arctic Alaska owned shore-based processors in Kodiak, Alaska, Newport, Oregon, Ucluelet, British Columbia and on Pier 91 in Seattle; a floating plant moored near Unalaska, and surimi processors in Toronto, Ontario, and Duluth and Motley, Minnesota. The buyer was Trident Seafoods. The purchase of Arctic Alaska strengthened Trident's position as the largest company in the U.S. pollock fishery; however, the purchase left Trident with more than the maximum allowed 30% processing capacity. To deal with this issue, Trident formed a new corporation and gave it to the primary owner's sons, calling it B&N Fisheries. (B & N stood for the last name of the owners, Bundrant and Ness.) Trident transferred enough quota to B&N to say below the 30% cap. Plesha believes that Tyson sold out too early:

> They had lost a lot of money in seafood. The irony is that after the AFA passed, their assets became quite valuable. Had they hung on for another year, they would have stayed in the business or sold at a far higher price. (J. Plesha, personal communication)

The next largest owner of AFA-qualified factory trawlers was the Glacier Fish Company, which owned the *Northern Glacier* and *Pacific Glacier*. Based on the catch history of their vessels, Glacier Fish Company received 3.1% of the DPA, or 7.7% of the catcher/processor sector allocation. Glacier Fish Company was owned by Breivik and other investors and the Norton Sound Economic Development Corporation (NSEDC), a CDQ entity that purchased a 50% stake in Glacier Fish Company in 1998. In May 2008, Glacier Fish Company purchased the *Alaska Ocean*, the largest AFA-qualified factory trawler. The *Alaska Ocean* had been owned by a partnership involving Nippon Suisan and Jeff Hendricks. The Japanese owners had been grandfathered in under the foreign ownership provision in the AFA. The *Alaska Ocean* held rights to 2.9% of the DPA, or 7.2% of the catcher/processor sector allocation. As part of the transaction, Nippon Suisan acquired a 25% stake in the Glacier Fish Company thereby strengthening their access to surimi.

The Arctic Storm Management Group managed the fifth largest AFA-qualified factory trawler fleet, the *Arctic Storm* and the *Arctic Fjord*. Together, these vessels represented 3.5% of the DPA, or 8.7% of the catcher/processor sector allocation. The *Arctic Storm* was originally financed through Pereyra's Profish International in collaboration with Norwegian partners. The owners of the *Arctic Storm* added Korean partners in the 1990s, in which they became 50-50 owners of the vessel. The ownership structure was allowed to continue under AFA grandfather provisions. Circumstances changed in the early 2000s when the Korean partnership underwent some changes that required them to divest 50% of their ownership stake to comply with the AFA. The *Arctic Fjord* had been rebuilt in Norway and was originally named the *Michelle Irene*. It was later bought through a 50-50 venture between Arctic Storm Inc., the owners of the *Arctic Storm*, and Norwegian interests. Arctic Storm, Inc. bought out the Norwegian interests in 1994. Bristol Bay Economic Development Corporation (BBEDC), a CDQ group, maintains a 30% ownership position in the *Arctic Fjord*. In the case of both vessels, prior to AFA they were managed by Arctic Storm, Inc. which was 50% Korean owned. The grandfather provision did not extend to Arctic Fjord management, so the management company—the Arctic Storm Management Group—is now 100% US owned. The company also owns rights to two catcher vessels in the HSCC, the *Neahkanie* and *Sea*

Storm, which are worth 0.6679% and 0.8226% of the DPA (D. Christensen, personal communication).

The remaining companies were all single vessel companies. Aleutian Spray Fisheries owns the *Starbound*, representing 1.6% of the DPA, or 4.0% of the catcher/processor sector allocation. It had been built brand new in the U.S. and one of its primary owners was Ness from Trident. There was also one company that had significant foreign ownership when the AFA was passed. It was Alaska Trawl Fisheries, which owned the *Endurance*. They received 1.4% of the DPA, or 3.4% of the catcher/processor sector allocation. After fishing as part of the PCC, Alaska Trawl Fisheries sold out to PCC. The *Endurance* was removed from active fishing and its allocation was split among the remaining 19 AFA-qualified vessels.

The AFA also allowed for any unlisted catcher/processor that harvested more than 2000 mt of pollock in 1997 to be allowed to fish in aggregate up to 0.5% of the directed catcher/processor quota. Only one vessel, the *Ocean Peace*, was believed to be eligible. It has not been a regular participant in the fishery, although it did participate in the 2008 and 2009 seasons.

To the catcher/processor sector which had been in a constant state of flux throughout the 1990s, the stability provided by the AFA has been critical to their financial survival. Under the inshore/offshore battle, their fraction of the TAC had decreased from nearly 80% in 1992 to 56% under the proposed Inshore/Offshore III and there was no reason to expect the decline to stop. The AFA stopped the decline, albeit at a low level. More importantly, the AFA allowed the catcher/processor sector to form a cooperative, giving each vessel an individual share of the pollock TAC. Vessels no longer had to race for fish; instead, they could pace their operation in a manner which allowed them to increase recovery rates, optimize product mix, and organize more efficient operations.

The AFA also ensured that there would be no new participants in the fishery and, more importantly, allowed for a reduction in capacity within the catcher/processor sector, something the sector badly needed. Members of the catcher/processor sector, although a little bitter about getting squeezed out of much of the pollock TAC, speak of the success of the AFA.

Mothership Sector

The AFA identified by name the three motherships that had been active in the pollock fishery and would be permitted to continue to operate in the fishery. The catcher vessels that could deliver to these motherships were not specifically named, but their numbers were limited to 20, the number of catcher vessels that had actively participated in the mothership sector in years immediately preceding passage of the AFA. The AFA reduced the mothership sector's share of the DPA from 11% to 10% without compensation. Due to variations in the total TAC, the mothership sector's share of the DPA has varied from over 150,000 mt in 2004 to a low of just over 81,000 mt in 2009 (Figure 1.11).

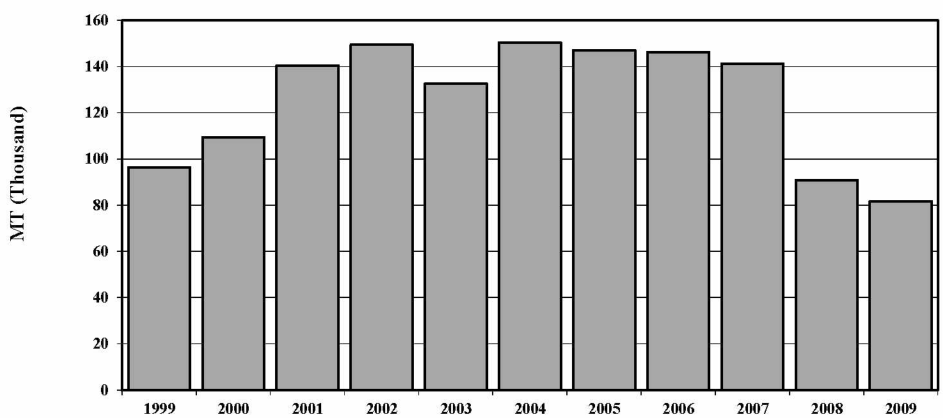

Figure 1.11. Mothership pollock harvests, CDQ included, 1999 to 2009[5].
Source: NMFS (2010); J. Ianelli, personal communication.

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[5] See footnote 3.

The AFA allowed for the formation of cooperatives in the mothership sector as long as 80% of catcher vessels agreed: the Mothership Fleet Cooperative (MFC) formed in 2000 with all 20 catcher vessels. Although the motherships themselves were also allowed to join the cooperative, none have. Under the contractual terms of the cooperative, catcher vessels are free to deliver their share to any of the three eligible motherships, although catcher vessel ownership in a particular mothership often dictates where they deliver their harvests. As a result, motherships have sold ownership in their vessels to ensure a measure of certainty in their fish supplies. For example, the *Golden Alaska* sold a significant percentage of itself to the CDQ entity Yukon Delta Fisheries Development Association (YDFDA) in return for assured deliveries from the two catcher vessels YDFDA purchased. (NPFMC 2002; YDFDA 2009).

The AFA specifically grants the three motherships operating in the pollock fishery an exemption from the foreign ownership requirements as long as after 1 October 2001, ownership changes do not exceed 50%. This allowed primary owners in the motherships to maintain their Japanese ownership and mortgages. Although Maruha is now involved in the management of all three motherships, changes in ownership have not been required. Nevertheless, ownership has changed such that all three motherships now meet the 75% U.S. ownership requirements under the AFA (B. Myhre, personal communication).

Motherships enjoy the advantage of being able to move with the fish, so catcher vessels that deliver to motherships have lower running costs and deliver fresher fish than catcher vessels that deliver to shore-based processors. Access to fresh fish helps motherships produce high quality roe and surimi that command premium prices. However, when the AFA was passed, the motherships were not equipped to produce fillets; the *Golden Alaska* has since invested in filleting machines and the *Ocean Phoenix* in H&G (head and gut) equipment.

The increased value derived from finished pollock products allows motherships to pay higher exvessel prices to catcher vessels than do shore-based processors, with an average real[6] price of \$0.220 vs. \$0.176 per kilogram, nearly 25% higher[7] (Figure 1.12). The mothership catcher vessels are also aided by increased flexibility in making deliveries, for unlike the inshore cooperatives, there is no penalty for switching motherships. In theory, this allows vessels to deliver to the mothership paying the highest price, driving up the value of pollock landings. As a result, mothership owners believe the AFA has transferred economic rents from the motherships to the catcher vessels that deliver to them (NPFMC 2002). However, because owners of motherships also hold ownership stakes or long-term contracts with the catcher vessels, the actual magnitude of rent transferred away from the motherships is unclear.

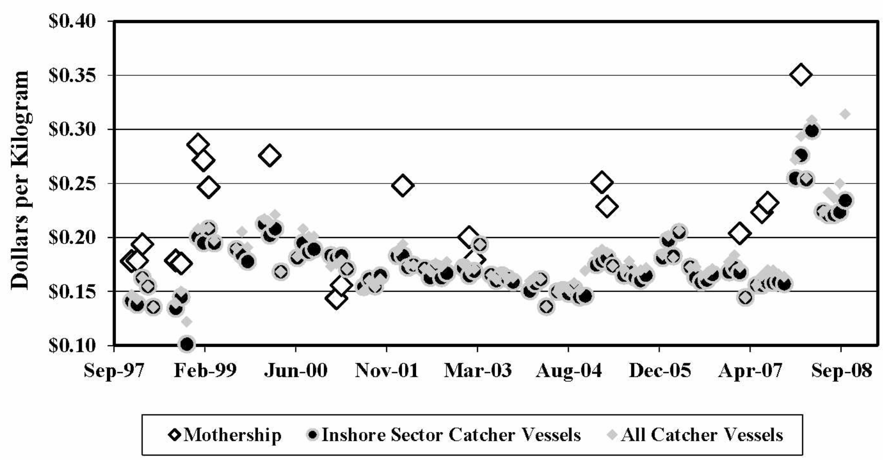

Figure 1.12. Real ex-vessel prices for motherships catcher vessels, inshore sector catcher vessels, and all catcher vessels, 1998- 2008.
Source: T. Hiatt, personal communication.

[6] Adjusted to 2008 dollars

[7] Due to confidentiality issues, this data is based on 20 monthly averages between 1998 and 2008.

The MFC catcher vessels are generally smaller than catcher vessels in the inshore sector because they can transfer laden codends to the motherships and do not have to store pollock onboard in refrigerated seawater fish holds. In addition, MFC catcher vessels have the advantage of fishing within a few miles of their processors, which contrasts with catcher vessels that deliver to shore-based processors that often travel distances of up to 500 miles between the port and the fishing grounds. Of the 20 catcher vessels eligible to participate in the mothership sector, 15 are also eligible to deliver to shore-based processors.

At 305 feet, the *Golden Alaska* is the smallest of the three motherships. It joined the pollock fishery in 1985. Røkke held an ownership stake in the *Golden Alaska* until 1987. The *Golden Alaska* focuses on processing surimi, roe, and fishmeal. It works with four catcher vessels, with three working at a time. Ownership at the time of the AFA was maintained through a 50:50 partnership between U.S. interests and Nichiro. The vessel is now owned through a partnership of independent fishermen, the YDFDA CDQ group, and Maruha, which maintains less than a 25% stake in the vessel (YDFDA 2009; B. Myhre, personal communication).

An $8 million upgrade in 2008 transformed the *Golden Alaska* from a primarily surimi processor to a flexible operation able to process fillets, mince, surimi, fishmeal and fish oil, and H&G. With this upgrade the *Golden Alaska* can profitably operate with only 60% of the raw fish previously required to maintain daily operations. “We went through 500 mt per day of round fish, now we’re down to a maximum of 350 mt,” says factory manager Staale Rotnes (Fiorillo 2009). Following the upgrade, product recovery rates nearly doubled from about 20% to over 40%. The *Golden Alaska* runs four processing lines and is capable of producing 1,000 fillets per minute. The improved equipment also reduces the need for freshwater used in production of surimi from about 600 mt per day to 200 mt per day. Because freshwater is produced through distillation, the reduction in water use has resulted in savings of 1,500 to 2,000 gallons of fuel per day. Over the typical 120 to 130 operating days in a season, this creates huge savings (Fiorillo 2009).

The 680-foot *Ocean Phoenix* is the largest vessel in the pollock fishery. It entered the fishery in 1989, and was initially built for Pereyra and a group of Norwegian partners to process fish for their catcher vessels. The *Ocean Phoenix* employs a crew of 220; processing crew members work up to 16 hours a day. It can handle 15 to 20 deliveries a day from aligned catcher vessels in the pollock and Pacific whiting fisheries. At the time of the AFA, there were seven catcher vessels identified to be owners in the *Ocean Phoenix* and it would have met the 75% U.S. ownership requirement, except that it maintained various other business relationships, including a vessel mortgage, which would have likely been excluded under the AFA (NMFS 2002; B. Myhre, personal communication). All current foreign marketing agreements with Maruha have now been deemed legal by the Maritime Administration under the AFA provisions. Maruha's ownership position remains under 25%, although primary management responsibilities now reside in the hands of Westward Seafoods, a subsidiary of Maruha (B. Myhre, personal communication). The *Ocean Phoenix* switched to H&G operation in 2004, spending $10 million on new equipment. Its operations are now similar to those of most vessels in Russian pollock fishery, where H&G product is frozen and shipped to China to be filleted and marketed as twice frozen fillets (Choy 2005).

The *Excellence* was a 367-foot foreign vessel that was reflagged in 1990 by an Alaskan company with investors that included Bill Phillips, a former aide to Senator Stevens and the Japanese company Taiyo (now Maruha-Nichiro Holdings). In 1991, its first full year of production, it processed nearly 60,000 mt of fish. It rotates 100-person crews, working two months on and two months off. The *Excellence* was 100% owned by U.S. citizens, but was bareboat chartered to Maruha, a non-citizen entity, when the AFA was signed (B. Myhre; personal communication). There were also ownership/operational links to five of the catcher boats (*Alyeska*, *California Horizon*, *Misty Dawn*, *Papado II*, and *Pacific Alliance*) that delivered to it at the time the mothership cooperative was established (NMFS 2002). Ownership is currently through U.S. investors and Maruha (less than 25%), with primary management responsibilities handled by a Maruha subsidiary (B. Myhre; personal communication).

In late 2009, Supreme Alaska Seafoods, the operator of the *Excellence* and Phoenix Processor Limited Partnership, owner and operator of the mothership *Ocean Phoenix*, announced a merger. Supreme Alaska Seafoods' owners will own Phoenix Processor Limited Partnership 50/50 with the existing partners. This merger was likely a result of the reduced TAC in 2008 and allows the two companies to reduce management and operational costs. Furthermore, it allows the quota to be fished by the more efficient *Ocean Phoenix*; the *Excellence* has not participated in the pollock fishery since the latter half of the 2008 fishing season (Sackton 2010).

Inshore Sector

The AFA allows six land based and two floating processors to participate in the inshore sector of the BSAI pollock fishery. Three of the land based processors, Alyeska, UniSea, and Westward, are located in Unalaska. The communities of Akutan, Sand Point, and King Cove are each home to one land based processor. The two floating processors in the inshore sector are required to operate in a single BSAI location each year, and at the time of the passage of the AFA, they anchored in Beaver Inlet in Unalaska to do their processing. In total, the inshore processors can take BSAI pollock deliveries from a maximum of 97 catcher vessels, as of 23 June 2000, according the regulations implemented by the AFA. The shore-based processors produce surimi, fillets, roe, fishmeal, mince, oil, and some additional byproducts. They also process a variety of species, including other groundfish, halibut, and crab, but have historically processed very little salmon (NMFS 2002).

The AFA allocated 50% of the DPA to the inshore sector, representing an increase of 42% over their share of the DPA under Inshore/Offshore I and Inshore/Offshore II. It also represented a 28% increase over the share granted in Inshore/Offshore III, which was never implemented due the passage of the AFA. This represented an increase in shares of the total TAC from 32.4% in 1998 to 42.8% in 1999 (Figure 1.7; Figure 1.8). In return for the increased allocation and reduction in factory trawler capacity, the inshore sector agreed to take on a $75 million loan. The terms of the loan commits members of the inshore sector to pay back the loan through a tax of 0.006 cents on every pound of pollock processed till the loan is paid off (AFA 1998). Even with the increased allocation in 1999, the actual amount of pollock harvested by the inshore sector has varied through the years, with their 2009 catch the lowest under the AFA (Figure 1.13).

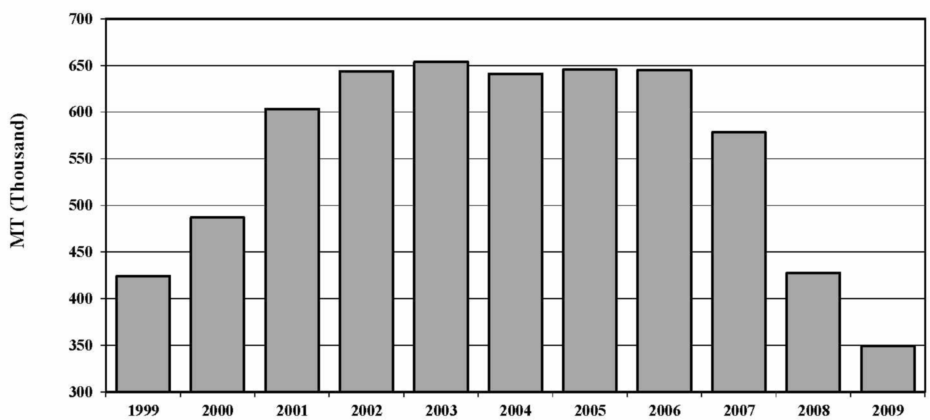

Figure 1.13. Amount of pollock harvested by the inshore sector, CDQ included, 1999-2009.
Source: NMFS (2010).

Under the AFA, fishery cooperatives are authorized to form in the inshore sector of the BSAI pollock fishery. However, unlike the PCC, HSCC, and MFC cooperatives which must form at the sector level, inshore cooperatives may form around each AFA qualified processor. If an inshore catcher vessel cooperative forms around a specific processor and meets certain qualifying criteria, NMFS is required to issue that inshore cooperative an exclusive allocation of BSAI pollock. Catcher vessels that join inshore cooperatives must then deliver 90% of their allocation to the processing plant to which their cooperative is tied. Switching cooperatives is potentially difficult, as it requires switchers to fish in an open access pool for one full year before they can join a new cooperative. This exposes them to the hazards of the race-for-fish both for target catches of pollock and for small amounts of bycatch (AFA 1998; NMFS 2002).

The six land based and two floating processors are owned by four companies and organized as seven cooperatives. The largest company, Trident Seafoods, is primarily owned by Bundrant and Ness. Trident owns land based pollock processing facilities in Akutan and Sand Point and the floating processor *Arctic Enterprise*. Trident's largest plant is in Akutan, and since the passage of the AFA, the company has shifted pollock production from Sand Point and the *Arctic Enterprise* to the Akutan plant. Trident's Akutan plant has capacity to process 1,400 mt of pollock per day (J. Plesha, personal communication). In 2009, Trident received 32.8% of the inshore quota through two cooperatives, the Akutan Catcher Vessel Cooperative and Arctic Enterprise Association (NMFS 2010; NMFS 2002).

The Arctic Enterprise Association initially included five vessels, four of which transferred their catch history to the cooperative. The fifth vessel, the *Intrepid Explorer*, fishes the cooperative's entire allocation. The Akutan Catcher Vessel Cooperative is much larger, with 36 vessels, 32 of which fished in 2008. In 1999, 19 of these catcher vessels were owned directly or through parties related to Trident Seafoods, giving Trident the ability to vertically coordinate fishing and processing activities (NMFS 2002). This number has likely increased since the passage of the AFA, as catcher vessels owners often sell their ownership interest to the processor they deliver to when they decide to divest their interest (J. Dooley, personal communication).

Three inshore processors are owned by Maruha-Nichiro, a partnership formed in October 2007 through the merger of two of Japan's largest seafood companies. The partnership controls 33.97% of the inshore quota through three cooperatives. The Peter Pan Fleet Cooperative delivers to the Peter Pan facility located in King Cove. In addition to pollock, Peter Pan processes king crab, bairdi and opilio tanner crab, Pacific cod, salmon, halibut and sablefish. Peter Pan receives 5.75% of the inshore pollock quota. The Peter Pan Fleet Cooperative includes 10 catcher vessels, only five of which fished for pollock in 2008. The cooperative left 23% of their quota unfished in 2008, presumably due to a combination of high fuel prices and soft product prices that summer (NMFS 2010; NMFS 2002).

The second Maruha-Nichiro plant, Westward Seafoods, is located in Unalaska. Westward focuses on pollock but also processes Pacific cod, halibut, crab, and salmon. The Westward Fleet Cooperative is composed of 12 vessels that receive 18.91% of the inshore quota. Only nine of Westward Fleet Cooperative catcher boats fished in 2008 (NMFS 2010; S. Wilt, personal communication). The processor held direct interest in at least five of the catcher vessels at the time of the passage of the AFA and, in addition, provided a guarantee on loans for three of the vessels. Westward has since developed ownership interests in additional vessels (J. Dooley, personal communication). Westward has set up a separate corporation, specifically for the purpose of buying catcher vessels from owners looking to divest their interest.

Alyeska Seafoods, the third Maruha-Nichiro plant, is also located in Unalaska. The Unalaska Cooperative that delivers to Alyeska receives 12.19% of the inshore quota, shared among 11 catcher vessels, eight of which fished in 2008. At the time of the AFA, Alyeska Seafoods held ownership stakes in at least six of the catcher vessels. Alyeska typically processes 400 mt of pollock per a day, but has peak capacity to process up to twice that much.

The UniSea processing plant in Unalaska and is owned by Nippon Suisan. The plant receives 24.26% of the inshore quota from the UniSea Fleet Cooperative, a cooperative of 14 vessels, one of which did not fish in 2008. UniSea has capacity for up to 1,100 mt of pollock per day. Although the quantity varies from year to year, pollock normally makes up 80% of the seafood processed at the plant, with crab and other groundfish making up the remaining fish.

The *Northern Victor*, a floating processor, is owned by Icicle Seafoods, which was bought by Paine & Partners, a San Francisco-based private investment firm, in September, 2007. The Northern Victor Fleet Cooperative receives 8.96% of the inshore quota. The *Northern Victor* has surimi equipment but focuses on fillets. In 2008, catcher vessels delivering to the *Northern Victor* were paid full price only for fish large enough to process as fillets; smaller fish were processed into low-value fishmeal.

Western Alaska Community Development Quota Program (CDQ's)

The AFA transformed the CDQ program into a permanent allocation of 10% of all BSAI groundfish and halibut, giving residents of remote western Alaska communities a permanent ownership stake in some of the richest fisheries in the world, fisheries that had been inaccessible to them due to a lack of shore-based infrastructure and a lack of access to the capital needed to compete in these large-scale, industrialized fisheries. In a discussion of opportunities for increased Alaskan investment in the groundfish fisheries, Alaska Department of Commerce, Communities and Economic Development (ADCCED) noted:

> Involvement in Alaska's groundfish fishery operations requires considerable investment and expertise. Factory trawler companies are multimillion-dollar operations. Their employees must possess sophisticated business and technical skills to compete in the industry. These companies not only employ seasoned captains, engineers, plant managers, maintenance crews, deckhands and processors, but headquarters are staffed with accountants, human resource professionals, administrators, lobbyists, marketing arms and sales forces. (ADCCED)

A desire to increase economic opportunity in impoverished western Alaskan communities and to overcome the lack of infrastructure and lack of investment capital were central to the purpose and design of the CDQ Program (Ginter 1995; National Research Council 1998; National Research Council 1999; Northern Economics 2001; Northern Economics 2002; Northern Economics 2009).

Currently, 65 coastal zone communities in western Alaska participate in the CDQ Program. These communities are aligned into six CDQ groups: Aleutian Pribilof Island

Community Development Association (APICDA), Bristol Bay Economic Development Corporation (BBEDC), Central Bering Sea Fishermen's Association (CBSFA), Coastal Villages Regional Fund (CVRF), Norton Sound Economic Development Corporation (NSEDC), and Yukon Delta Fisheries Development Association (YDFDA). (Communities and regions represented by the six CDQ entities are represented in Figure 1.14.) As initially structured under Inshore/Offshore I, the six CDQ entities submitted annual proposals to ADCCED, wherein they requested shares of the CDQ allocation and specified the suite of fishery-related investments and activities that would be supported by royalties generated from leasing the shares. With the reauthorization of the MSFCMA in 2006, NMFS assumed responsibility for program administration and CDQ entities were allowed to use up to 20% of their annual royalties to support projects unrelated to fisheries or fisheries infrastructure. For example, the CDQ entities were authorized to use royalties to match grants or leverage dollars from other agencies, foundations or non-profit projects, to support economic development within their region.

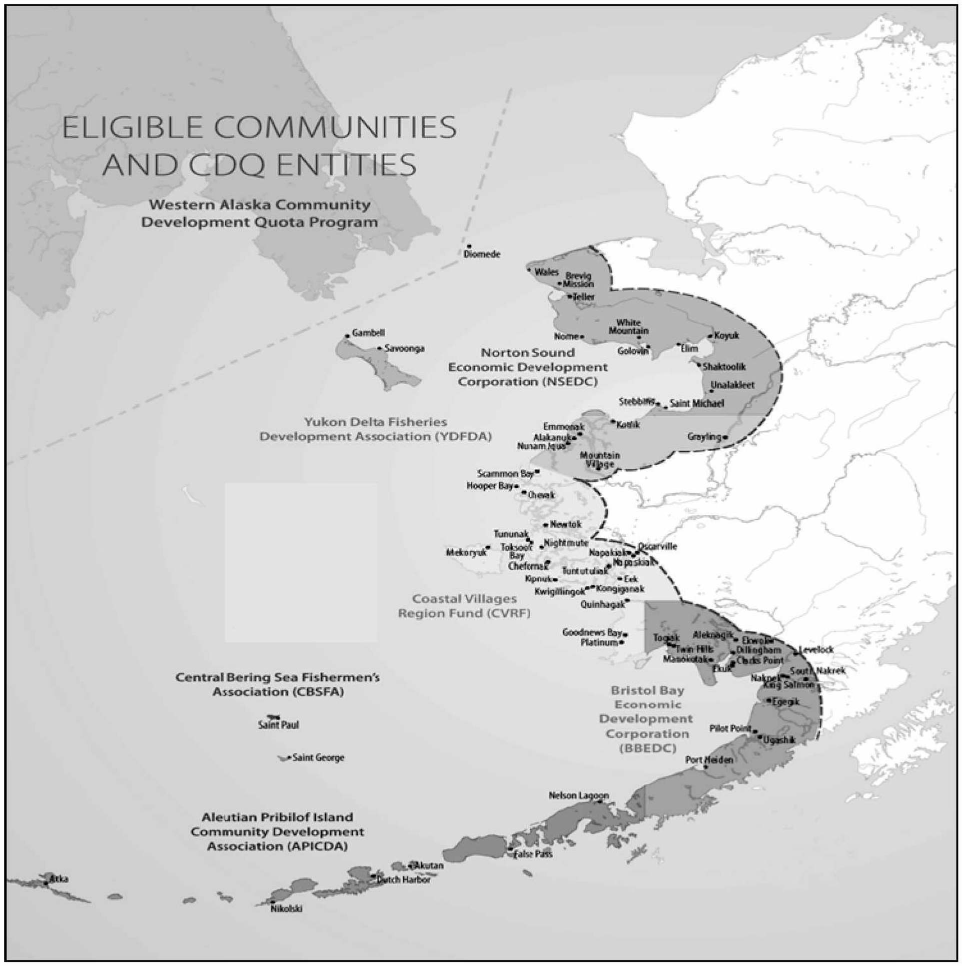

Figure 1.14. CDQ communities and regions.
Source: WACDA (2010).

The CDQ revenues were initially almost entirely derived from royalties obtained from leasing quota to catcher boats and factory trawlers. Between 1992 and 2008, approximately $653 million were generated from royalty payments to CDQ entities (ADCCED; Figure 1.15). Pollock leases have been an important component of the royalties, composing nearly 80% of the revenues over the same period. The real value of a metric ton of pollock rose through the 1990s as the value of the pollock grew, but has remained fairly stable between 1998 and 2008 (Figure 1.16). As a result, differences in pollock royalties from year to year since 1998 have been largely a function of changes in the BSAI pollock TAC rather than changes in the price of pollock. The exception to this rule is APICDA, who has a market based agreement with its CDQ partner Starbound. Although this has created some volatility in its pollock royalties compared to other CDQ groups, it has allowed the group to share in increases of pollock value. In 2008, for example, when the value of pollock rose sharply, the group received over $400 per mt versus an industry average of $341 (L. Cotter, personal communication).

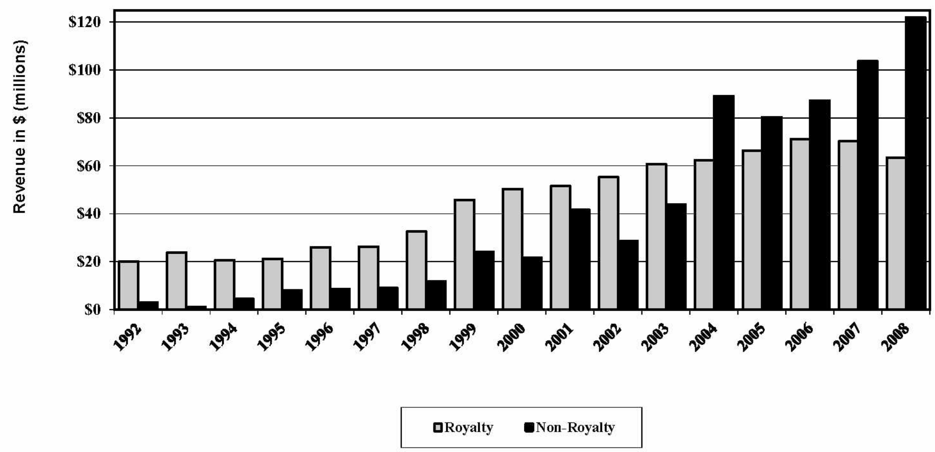

Figure 1.15. Real CDQ royalty and non-royalty revenue, 2009 dollars, 1992-2008. Source: WACDA (2008); ADCCED (2009); WACDA (2009).

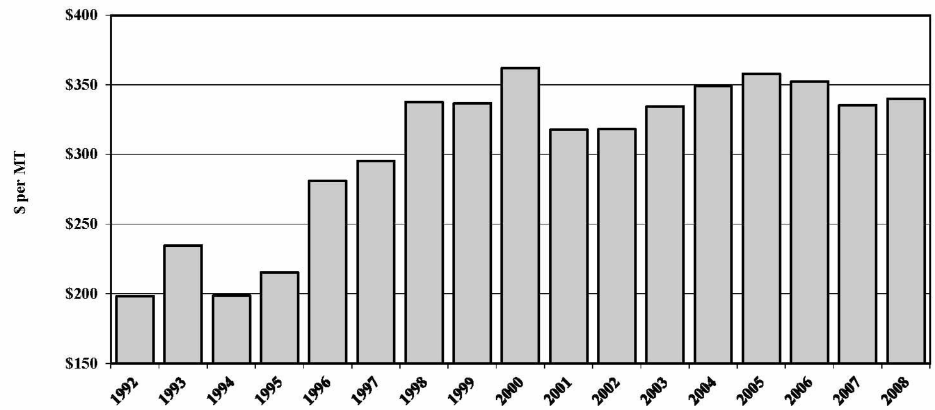

Figure 1.16. Real CDQ pollock royalty price, 2009 dollars, 1992-2008[8].
Source: ADCCED (2009); APICDA (2009); CVRF (2009); NSEDC (2009).

Over time, CDQ entities began to generate more and more revenue from investments and other business activities. These non-royalty revenues totaled over $620 million for 1992 through 2008. The dramatic increase in CDQ revenues in 2004 was due, in part, to investment payouts to several CDQ groups and high pollock and crab prices. That year marked an important milestone, as it was the first year in which CDQ entities earned more from investment and business activities than they did from royalties (Figure 1.15). Combined data from the six CDQ annual reports indicate that total revenues were over $168 million in 2007, and in spite of the global downturn, CDQ revenue rose to over $186 million in 2008 (DeMarban 2009; WACDA 2009).

While the overall increase in revenues is significant, it is important to recognize the increase of non-royalty earnings as a fraction of total revenues. Non-royalty revenues derive from investments, such as investment in pollock factory trawlers, motherships, and

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[8] The 1992-2005 data is based on all six CDQ entities. Data for 2006-2008 data excludes YDFDA data. APICDA, CVRF, and NSEDC are the implied prices from 2007-2009 annual reports. BBEDC and CBSFA prices are based on CVRF information since their quota was pooled together with CVRF for lease to American Seafoods in 2006-2008.

catcher boats. The CDQ entities have also invested in local shore-based processing facilities and infrastructure, which are typically less profitable than their investments in the industrial fisheries, but generate important social capital. APICDA CEO Larry Cotter describes his responsibility as:

> It is my job to balance the company's portfolio between investments that generate revenue, and the projects that benefit our communities through jobs but normally lose money. (L. Cotter, personal communication)

With the increase of both royalty and non-royalty related revenue, the CDQ entities have seen a substantial increase in their net assets. The CDQ entities as a group have never seen a decrease in their net assets, although on occasion, individual CDQ entities have experienced annual losses. The net assets of the CDQ entities increased from about $456.9 million in 2007 to $480.6 million in 2008 (Figure 1.17). This results from investments in various pollock companies, community infrastructure, and ownership in various other fishing vessels. One difficulty in increasing assets year after year is that the options for investment in these communities are limited. Although companies are now allowed to invest 20% a year in non-fishery related business, they are still restricted to investments within their regions. This restriction is in contrast to the Alaska Native Regional Corporations which were granted legal authority to invest assets however and wherever they choose. Nevertheless, the CDQ entities have generated favorable returns on assets.

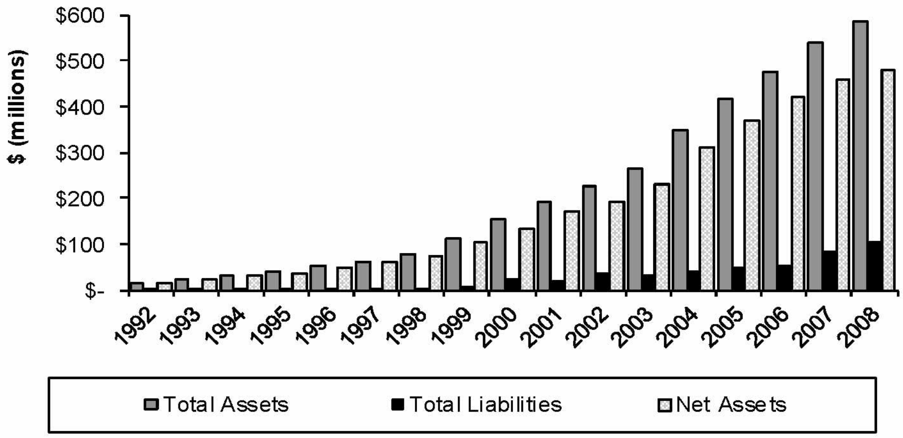

Figure 1.17. CDQ assets, liabilities, and net assets, 1992-2008.
Source: WACDA (2008); WACDA (2009); ADCCED (2009).

Because CDQ entities are directed to foster economic development within their regions, their performance cannot be judged simply in terms of asset growth. Additional performance dimensions include education and vocational training, employment, and wages.

All of the CDQ entities fund scholarships for local residents. For instance, BBEDC spent $250,000 to help 213 people obtain vocational training in 2008, with some of that spent on financial counseling for fishermen (BBEDC 2009). ADCCED (2009) reports that funds provided by CDQ entities provided training to over 13,000 people[9] between 1993 and 2005 (Figure 1.18).

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[9] This estimate may include some double counting because individuals can take advantage of more than one training program.

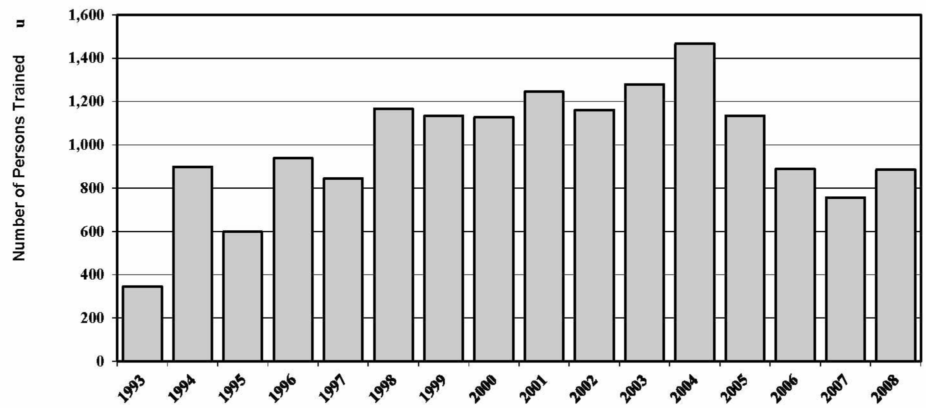

Figure 1.18. CDQ training, 1993-2008.
Source: WACDA (2008); ADCCED (2009); WACDA (2009).

The training, in turn, supports what may be considered to be the primary goal of the groups: increased economic opportunity for the communities through increased employment. Contracts between CDQ entities and the companies that lease their quota shares have often included guarantees of positions aboard vessels as well as royalty payments. CDQ entities have played a significant role in providing employment and providing funding for projects that have increased regional employment. Employment related to CDQ entities has grown from 317 jobs in 1993 to 4,473 jobs in 2008 (ADCCED 2009; Figure 1.19). The CVRF has been successful at creating local jobs through building local processing facilities and other income generating businesses. The CVRF processing facility at Quinhagak processed 2.3 million pounds of salmon in 2008. In 2009, CVRF completed construction of a $25 million salmon processing facility in Platinum, the largest-ever CDQ project. In 2008, as a result of its continued focus on economic development, CVRFs 580 employees earned $4.4 million – with 80 percent being located within the region. Combined with 629 fishermen, CVRF was the region's largest private-sector employer.

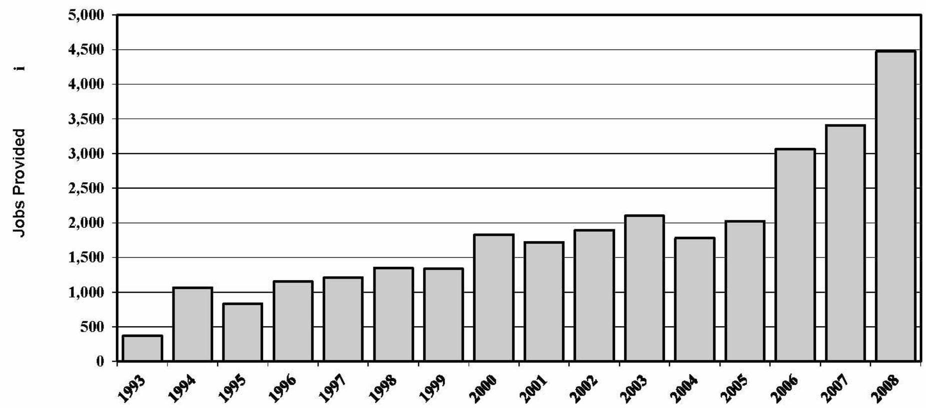

Figure 1.19. CDQ Employment, 1993-2008[10].
Source: WACDA (2008); ADCCED (2009); WACDA (2009).

The wages associated with the CDQ-associated employment have been a boon for their respective regions. Jobs generated by the CDQ Program include work aboard catcher and catcher/processor vessels, internships with fishing industry partners or government agencies, work in processing facilities, and management/administrative positions, creating an excess of over $250 million in wages between 1993 and 2008 (Figure 1.20). These numbers may seem modest, but it is important to recognize that this is an economically disadvantaged and lightly populated region. Total population in the 65 CDQ communities was only 27,773 in 2008. Residents of these communities have an average per capita personal income of around $26,000, compared to a statewide average of $40,000. Nearly 22% of the region's residents live below the poverty level, compared to a statewide average of only 9.4% (WACDA 2009). The jobs and wages provided by the CDQ entities provide much needed employment and income.

[10] 1993-2008 data includes employment attributed to crew members, as well as wage and salary employees. 2006-2008 data additionally includes commercial permit holders paid.

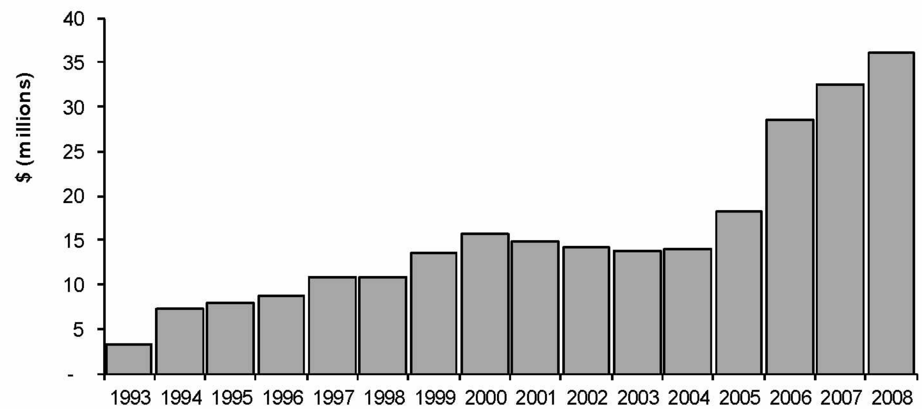

Figure 1.20. Real CDQ payroll, 2009 dollars, 1993-2008[11].
Source: WACDA (2008); ADCCED (2009); WACDA (2009).

In addition to the pollock CDQ allocation, the AFA also expanded the CDQ allocation of the TAC for all other commercial fish species in the Bering Sea from 7.5% to 10.0% (NMFS 2007). This, coupled with the revenues received from pollock investments, allowed CDQ entities to invest in fishery related projects that provided opportunities for local fishermen. These groups have invested in vessels, processing facilities, and infrastructure needed to allow residents to participate in a variety of fisheries that would otherwise be unavailable. For example, BBEDC has been able to provide an ice barge which allows local fishermen to increase the value of their salmon harvests. They have also created a program which provides financial assistance to enable residents to buy fishing permits (BBEDC 2009). The CBSFA has directly purchased crab harvesting and processing quota, as well the vessels to harvest their non-pollock shares (DeMarban 2009). The non-pollock quota has not only given the CDQ communities additional revenue from royalties, but the opportunity to succeed.

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[11] Data from 1993 to 2008 includes wages and salaries. 2006 – 2008 data includes the addition of payments to fishermen.

American Fisheries Act's Impact on the Pollock Fishery

The shift in management from a race-for-fish fishery to the cooperative structure had huge impacts on the Bering Sea pollock fishery. The pollock fleet, which had fought on the water over the fish and battled through Congress and NPFMC over fishing rights, was now able to focus on maximizing joint efficiencies in pollock harvesting and processing.

Slower Fishing Pace

An immediate benefit of the AFA cooperatives was the ability to spread harvests over longer seasons. Fishermen no longer had to race for fish; instead, they knew the amount of fish they were entitled to catch before the season started. They were able to coordinate a slower fishing pace, so processors could maximize their returns on the fish, thereby increasing what they were willing to pay for the fish. In addition, fishing effort could be directed in periods of the season when the fish provided a higher oil and flesh content. For example, the B season started in June, which is a period when oil and flesh recovery is near its lowest because the pollock had depleted their energy reserves during spawning. Fishing vessels could now choose to fish later in the B season when there was an opportunity for greater recovery, allowing for increased returns for the harvesters and processors.

Since 1998, pollock catch per week has declined steadily in concert with a steady increase in the number of weeks fished; the overall pace of pollock removals has declined from a season peak of about 13,000 mt per week in 1997 to a season peak of approximately 6,000 mt per week in 2000 (NPFMC 2002). While this slowing of the overall pace of pollock fishing in the Bering Sea may also be partially due in part to Steller sea lion conservation measures imposed in 1999 that were designed to disperse the fishery over time and space, the elimination of the race-for-fish is probably the largest contributing factor (NMFS 2002; Wilen and Richardson 2008).

Safety

Another benefit to harvesting under the AFA is increased safety. Commercial fishing has always been a dangerous occupation. From 1991 to 1998, occupational fatality rates in groundfish fishing off of Alaska were 46 per 100,000, an occupational fatality rate that is about 10 times the national average (Lincoln and Conway 1999). Part of the reason is that fishermen who compete for fish in a race-for-fish are often impelled to fish at times and places that are not very safe. Additionally, the higher costs and lower revenues in a race-for-fish fishery lead to lower profits margins and, indirectly, to less investment or attention to issues of safety. This includes postponing maintenance and delaying equipment upgrades (GAO 2000).

The harvesting cooperatives have allowed fishermen more flexibility in their harvest and permit them to be more conscious of safety issues. Even in the first two years following the introduction of the AFA, reports indicate that the pollock fishery was being conducted in a safer manner under co-ops (GAO 2000). GAO (2000) concludes that the safety improvements can be attributed to the fact that under the AFA, vessels can afford to put off fishing in dangerous weather conditions because they know their fish will still be there at the end of a storm. However, it should be noted that fishermen have commented that the AFA has made no difference in the operation of fishing vessels with respect to weather: fishing vessels do not make money while docked at port, and therefore, continue fishing until their quota is harvested.

Another safety benefit arises when older vessels are retired from the fleet. When a cooperative chooses to tie-up some of their vessels, the older and least sea-worthy vessels are eliminated first. For example, when the UniSea Fleet Cooperative retired the 165 foot *Pacific Monarch*, John Iani, Vice-President of UniSea, reported that:

> It was a neat deal .... The *Pacific Monarch* was old and kind of run down and a little bit dangerous to be fishing. (Loy 2001)

An additional benefit is the increased profit vessel owners receive as a result of the cooperatives. Vessels that were only very close to breaking even under the race-for-fish are making more while enjoying reduced costs. As a result, increased money is available for maintenance and repairs.

Optimized Product Mix

Implementation of the AFA made it easier for fishermen and fish processors to tailor their output to satisfy the demands of diverse markets. Under the race-for-fish, many processors focused on surimi production because it is the fastest way to process large quantities of fish. Because the AFA cooperatives could guarantee each member a predictable amount of fish, participants were able to invest in machinery capable of producing pollock fillets and could slow down fishing to produce the more valuable product (Figure 1.21; GAO 1999). Processors with the ability to produce fillet and surimi were better able to determine the product mix that would allow them to maximize the use of fish and generate the greatest profit (Wilen and Richardson 2008). The increased flexibility also allowed companies to respond to short-term market changes. This was an advantage for the catcher/processor sector, when in early 1999, their flexibility allowed them to respond to increased demand and rising fillet prices by increasing fillet production while decreasing surimi production (GAO 1999). Another instance was in 2008, when the prices of surimi soared, processors were able to focus on producing more surimi in order to meet the increased demand (Figure 1.22; S. Wilt, Personal Communication).

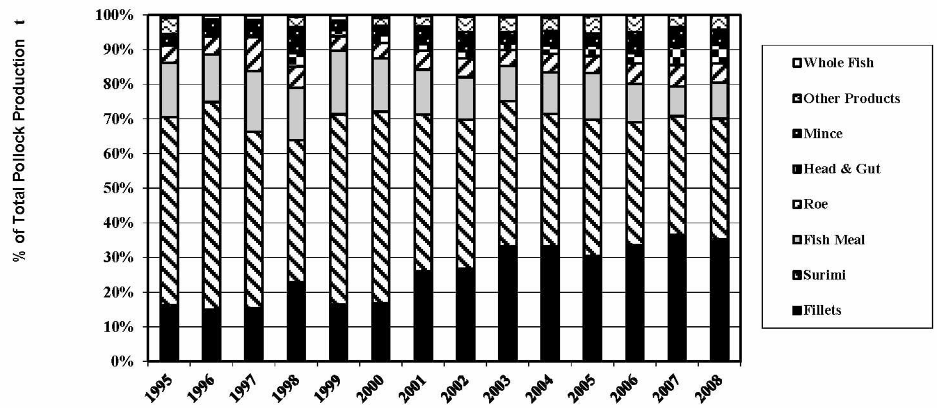

Figure 1.21. Pollock production mix for BSAI pollock production, 1995-2008.
Source: NMFS (1999d, 2001b, 2005, 2009c, 2010).

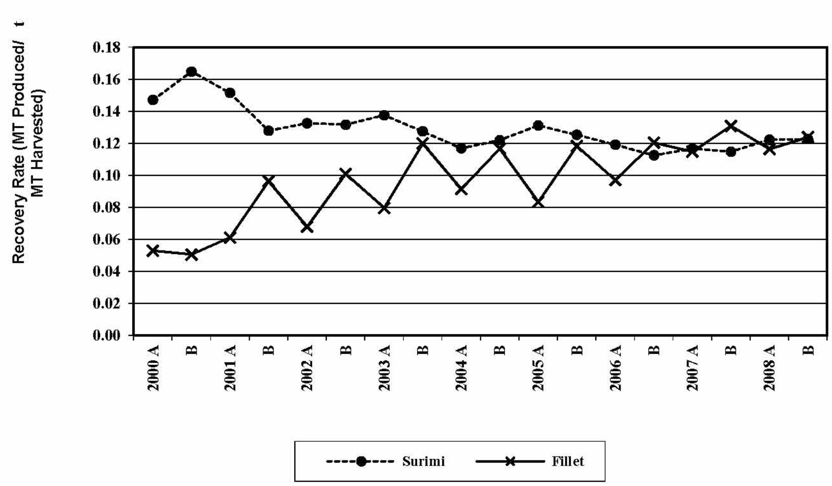

Figure 1.22. Surimi and fillet recovery rates[12] for BSAI pollock harvests by season, 2000-2008.
Source: NMFS (1999d, 2001b, 2005, 2009c, 2010).

[12] It should be noted that these are not true recovery rates for a load of fish; rather, this is the overall rate of quantity produced to the total harvest, which does not account for factors such as discards.

Increased Product Value

The AFA has also allowed harvesters and processors to focus on maximizing the value of the fish they harvest. This happens in a couple ways. First, there has been a reduction in the fish taken per tow in the catcher/processor sector. The reduced throughput has allowed catcher/processors to better match fish landings with their processing capacity. This suggests that when freed from the race-for-fish, operators have been harvesting fewer fish per tow, with the intent of reducing bruising in the flesh and contributing to improved roe quality. The slower processing pace has also permitted greater specialization within the processing lines, since it allows equipment to be more precisely tuned to the various sizes of fish harvested. Processors were able to maximize returns through increased recovery of higher value products, by increasing the percentage of the pollock to be used for fillets (Figure 1.15; GAO 2000; NPFMC 2002).

In addition, release from the race-for-fish has allowed harvesters to more closely tune their catches to target fish of a desired size. By slowing down fishing, vessels can spend more time searching for fish of the desired size (GAO 2000; NPFMC 2002; D. Abbasian, personal communication). Those processors that have focused on surimi production are able to work with fish as small as 200 g. On the other hand, processors that focus on fillet production may be willing to make it worthwhile for vessels to deliver partial loads of large fish (D. Abbasian; personal communication).

Increased Utilization of Raw Fish

The AFA has allowed pollock companies to focus on maximizing their recovery of marketable product from their catches. Processors report that elimination of the race-for-fish has allowed companies to increase the yields from pollock harvests (GAO 1999; GAO 2000). Processors are able to devote attention to using scraps, frames, and trimmings to produce salable, but low-value, products such as oil and fishmeal. Under the race-for-fish, vessels could not afford to waste scarce storage space on low-value products when the same space could instead be used to store fillets and surimi. They also could not afford the time to travel to a port to offload low-value products; doing so would have reduced their total catches.

In 1999, the first year of the PCC cooperative, catcher processors increased pollock utilization by about 20% (GAO 1999; GAO 2000). Further gains following the passage of the AFA have been evident throughout the fishery. The recovery rates of pollock harvests in the BSAI have increased nearly 39% from 0.25 in 1998 to over 0.35 in 2008 (Figure 1.23). One reason for these gains is a large reduction in discards, which decreased from 91,982 mt in 1997 to 7,661 mt in 2008 (Figure 1.24). A majority of processors report the ability to produce fillet, surimi, roe, fishmeal, mince, and oil with recovery rates of over 40%[13] and are able to process everything except eyes, skin, bones, and water. Previously, any part of the fish not used for fillets or surimi was either turned into fishmeal and oil or ground up and discarded at-sea. Pollock processors have also increased their flesh (fillet and surimi) recovery rates at an even faster pace than overall recovery rates, with gains of 45% from 0.17 to almost 0.25 over 1998 - 2008 (Figure 1.25). The quicker pace indicates that processors have been able to not only increase their overall recovery rates, but also increase the portion of the fish devoted to the more valued flesh products through improved cutting techniques and slower throughput.

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[13] There are several reasons why recovery rates seen in Figure 1.16 are lower than data reported by pollock processors. First, much of the fish oil produced and utilized by fish processors is not reported to NMFS because it is used in plant operations. Another factor is that fish processors likely do not include the impact of discarded catches within their calculations when providing their utilization rates. In addition, it was only possible to subtract out the weight of the finished H&G product, which was significantly smaller than the original catch after removal of roe and intestines.

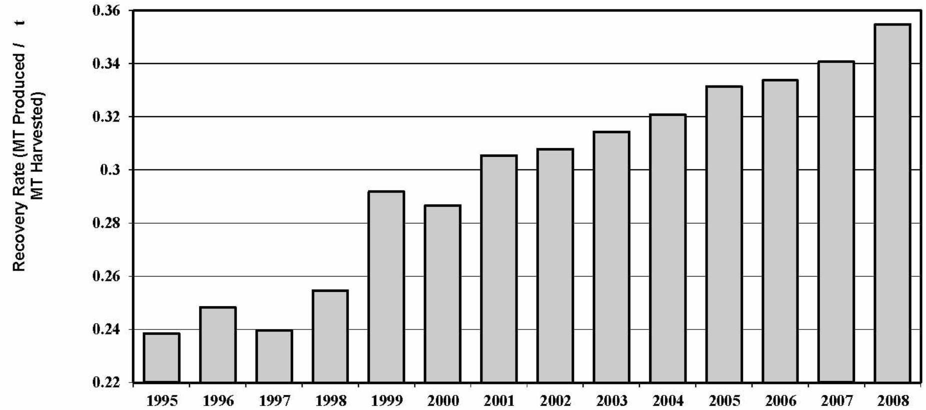

Figure 1.23. Recovery rate for BSAI harvested pollock excluding whole fish and H&G, 1995-2008.
Source: NMFS (1999d; 2001b; 2005; 2009c; 2010)

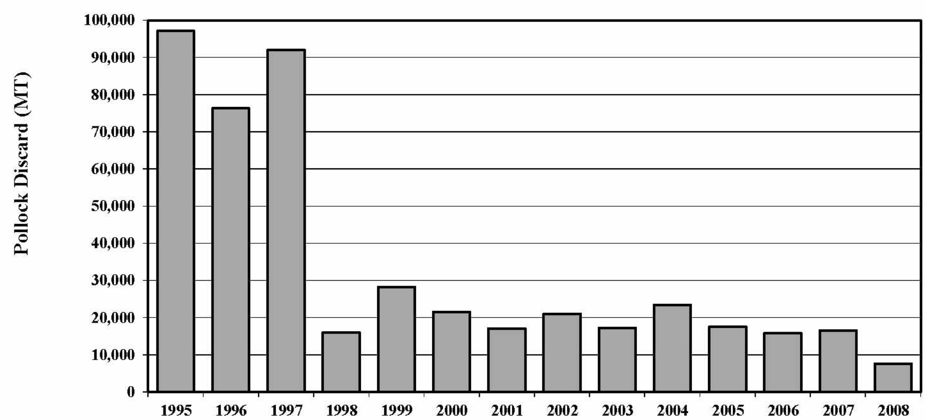

Figure 1.24. Discarded pollock catch in the BSAI, 1995-2008.
Source: NMFS (2010)

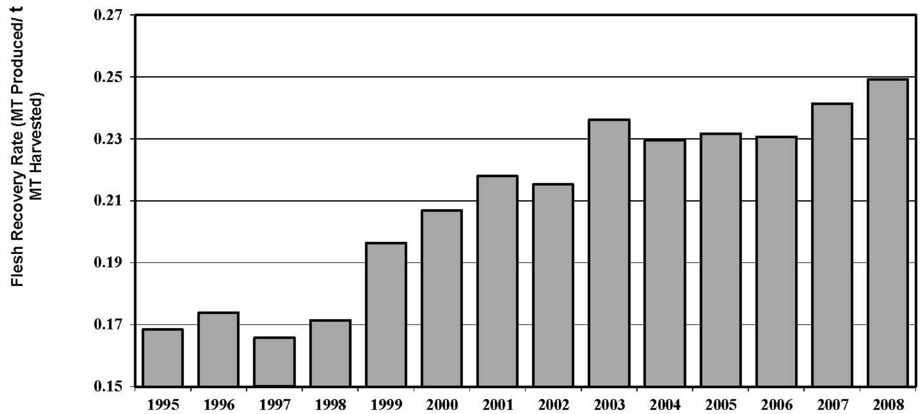

Figure 1.25. Flesh recovery rate for BSAI harvested pollock excluding whole fish and H&G, 1995-2008.
Source: NMFS (1999d; 2001b; 2005; 2009c; 2010).

Much of these gains are due to increased long-term planning, which is another result of the cooperatives. Companies that were once looking to make it through the season are now able to plan for the future, allowing them to purchase equipment that may take several years to amortize. Fishmeal machinery requires a significant investment, and under the race-for-fish, it was impossible for most companies to justify spending the money if they weren't even sure they were going to make it through the season. Allowing companies secure rights to shares of the pollock TAC gave them the confidence needed to support investments that increased utilization rates (Felthoven 2002; Felthoven and Morrison Paul 2004).

Decreased Costs

The AFA cooperatives also allowed increased economic efficiency through decreased costs. For example, operations are able to trade quota allocations between vessels within a given cooperative. This makes it possible for vessels with low operating costs to harvest the allocations of less efficient vessels. A good example of this is Trident's factory trawler fleet. Of Trident's five AFA-qualified factory trawlers, only three are used to catch and process pollock; the *U.S. Enterprise* and the *American Enterprise* have not left port for years and will most likely be scrapped in upcoming years (J. Plesha, personal communication). Another opportunity for cost savings occurs near the end of a season, when vessels do not have enough remaining quota for a full trip, they can pool their quota shares onto a single vessel. In addition, vessels have been able to reduce their fuel consumption by slowing their cruising speed to and from fishing grounds. For example, the C/V *Pacific Prince* is able to halve fuel costs per mile when travel time is not an issue (J. Dooley, personal communication).

Operational efficiencies available under cooperatives are another reason companies may experience reduced costs. Processors may choose to shift the timing of their participation in the BSAI pollock fishery to avoid overlap with peak production periods in other fisheries. For instance, pollock processing may be accelerated or delayed to allow processing facilities to be dedicated to salmon or crab processing activities. Another operational benefit under the AFA is that B season catches can be delayed to late summer or early fall when fillet yields are higher and oil content is higher. Fish oil can be used in burners to supplement diesel, allowing significant fuel savings (Alaska Energy Authority 2005).

Marine Stewardship Council Certification

Harvesting cooperatives have benefited the pollock fishery by fostering a new spirit of cooperation. Under the race-for-fish, companies were in constant competition with each other, but since implementation of the AFA, pollock operations have been more willing to work together for the benefit of the fishery as a whole. A prime example of this was seeking sustainable seafood certification from the Marine Stewardship Council (MSC). The MSC fishery certification program uses a third party to review the current condition and management of a fishery, after which it rewards the fishery with a seafood eco-label that recognizes sustainable management practices. The certification process is arduous and costly, requiring the fishery's time and resources. In 2001, the pollock industry began the certification process, and after four years, obtained MSC certification.

The MSC certification provides buyers with what many regard as an independent assessment of how well a fishery is being managed. Some buyers value credence attributes such as 'organic', 'free-trade', 'shade-grown', and 'certified sustainable' and are willing to pay price premiums for otherwise undifferentiated products (Wessells et al. 1999; Johnston et al. 2001; Wessells 2002). It is perceived that MSC certification provides Alaska pollock preferential access to European and North American markets. In contrast to the pollock resource in Russia, which faces challenges due to concerns about enforcement and monitoring of harvests and the basis for determining harvest levels, MSC certification of the Alaska pollock fishery signals wholesale buyers that they can rely on consistent long-term availability of Alaska pollock (Gudmundsson and Wessells 2000; Van Zile 2005). The MSC certification is particularly important in western European markets, where households are concerned with the sustainability of their seafood and do not trust national or European Union reports on the condition of fish stocks or the sustainability of fisheries management. As the premier eco-label, MSC has given Alaska pollock advantages in the European market, and advantage that is expressed in a price premium relative to comparable grades of Russian pollock. The number of international fisheries that have met MSC standards and certification has grown enormously over the past two years, with many European retailers and brand owners now committed to this ecolabel (EU Fish Processors' Association 2008). Bird's Eye has launched the Sustainable Fish Finger, an Alaska pollock product that is set to compete and replace some cod products in the British market. In the U.S. market, MSC certification also gives Alaska pollock an extra boost. Wal-Mart has set a 100% sustainable fish target for North America, and has begun to carry Alaska pollock in its frozen section. McDonald's has declared a commitment to sustainable fish products, using Alaskan pollock in all their fish sandwiches. The cutbacks in the pollock TAC in 2009, however, have forced McDonald's to look elsewhere, as they announced their

European restaurants have converted to haddock in order to preserve their Alaska pollock for the U.S. market (MSC 2006; MSC 2007; Eurofish 2009).

CDQ Partnerships

The CDQ groups have impacted western Alaskans in numerous ways, including employment, infrastructure, and access to opportunities. But western Alaskans are not alone in benefiting from the CDQ program. Pollock operations, particularly factory trawlers, have enjoyed benefits from business ties to CDQ entities. Each CDQ entity has chosen different ways to involve themselves with the pollock fishery. Perhaps the most successful of these is CVRF. The CVRF received 24% of the CDQ quota in 2009. The company has been successful with its investments, with $44 million in revenue reported for 2008, making it top among the six CDQ groups for that year (Figure 1.26). CVRF has done particularly well from its investments in the pollock fishery. The company has made substantial investments in the catcher/processor sector, beginning with purchase of a 23% stake in American Seafood in 2000 when Røkke sold out of the company (American Seafoods Group LLC 2002). The CVRF extended its ownership stake in American Seafoods in 2006, when they participated in the $81.75 million buyout of Centre Partner's 23% equity interest in American Seafoods (American Seafoods Group LLC 2006). This brought CVRF's ownership stake to over 46%.

The CVRF, in partnership with BBEDC, CBSFA, and YDFDA (for their B season share), pooled their allocations of pollock quota together and leased their shares to American Seafoods. By aggregating their shares, they were able to leverage their bargaining position and pool the associated bycatch allowances and negotiate lease prices with American Seafoods to around $330 per metric ton for their CDQ pollock. In 2009, however, CVRF did not renew their longstanding lease agreement with American Seafoods and instead entered into a lease agreement with the Arctic Storm Management Group. While this seemed like a peculiar move, considering their vested interest in the success of American Seafoods, CVRF has thus far profited under the leadership of

Morgen Crow and is likely to benefit from this action as well (CVRF 2007; CVRF 2008; CVRF 2009; DeMarban 2009).

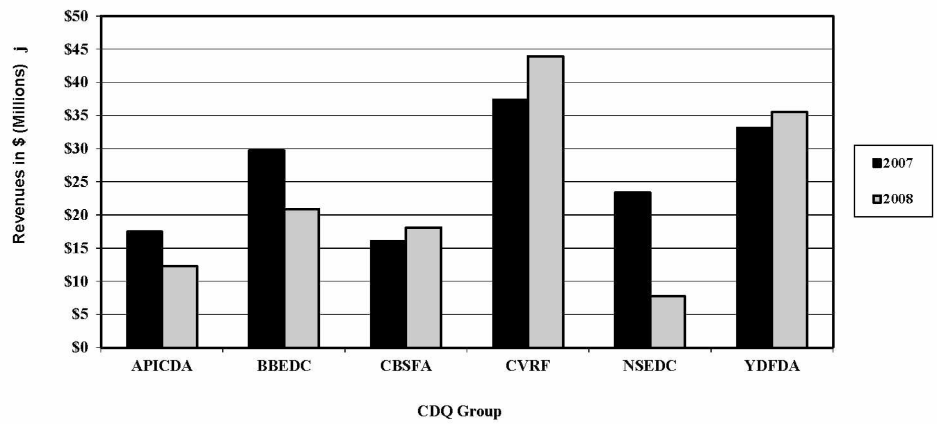

Figure 1.26. Annual Revenues for CDQ entities in 2007 – 2008.
Source: DeMarban (2009).

The NSEDC received 22% of the CDQ pollock allocation in 2009 but only reported total revenues $7.7 million in 2008. The low revenues were mainly due to the NSEDC's large holding of short term securities, which have decreased in value during the global economic downturn (Figure 1.26). The NSEDC has invested back in the community in a variety of ways, including $1.2 million in energy subsidy for qualified Norton Sound households and $6.4 million in wages to 515 people in 2008. The NSEDC held a 50% ownership stake in the Glacier Fish Company until Glacier Fish acquired the *Alaska Ocean*. Under terms of the acquisition, Nippon Suisan gained a 25% ownership stake in Glacier Fish; NSDEC's ownership stake declined to 37.5%, albeit of a now larger company. The NSDEC received around $330 per metric ton for their CDQ share of pollock from Glacier Fish in 2008, up from around $323 in 2007 and $318 in 2006 (NSEDC 2007; NSEDC 2008; DeMarban 2009; NSEDC 2009).

The BBEDC received 21% of the pollock CDQ allocation in 2009. They earned $20.9 million in revenues in 2008, a decrease from the $29.7 million earned in 2007. The

BBEDC awarded $159,000 to each of the 17 regional communities in 2008 to help finance economic-growth projects and is one of the only CDQ groups with their primary headquarters located in western Alaska. The BBEDC owns 30% of the *Arctic Fjord*, which is managed by the Arctic Storm Management Group. They have also invested in several catcher vessels. The BBEDC owns: 50% of the *Morning Star*, which delivered to Alyeska Seafoods in 2008; 50% of the *Dona Martita* and *Arctic Wind*, which both deliver within the Westward Fleet Cooperative; 50% of the *Morning Star*, which delivers within the Peter Pan cooperative; and 50% of the *Defender*, which delivers to the UniSea cooperative. The BBEDC leased their pollock CDQ shares to American Seafoods in 2008 (BBEDC 2009; DeMarban 2009).

The APICDA received 14% of the pollock CDQ allocation in 2009. In 2008, APICDA invested $5 million to complete the Bering Pacific Seafoods plant in False Pass. The APICDA was poised to move forward with construction of two additional shore-based processing facilities in 2009 and 2010 in St. George and Nelson Lagoon. This is in addition to the Atka Pride Seafood processing plant that APICDA built, and has owned and operated with the Atka Fishermen's Association since 1994. The APICDA provided higher education scholarships to 61 individuals in 2008, totaling $228,555. The group owns 19 seafood harvesting and catcher/processing vessels directly or through joint ventures with other companies, including 20% of the *Starbound* which fished 75% of APICDA's pollock CDQ in 2008. The APICDA also has a 50:50 partnership with Trident Seafoods in ownership of the pollock catcher vessel *Golden Dawn* (L. Cotter, personal communication).

The YDFDA received 14% of the pollock CDQ share in 2009. The YDFDA bucked financial trends in 2008 with revenues of $35.5 million, up from $33.1 million earned in 2007. Primarily through Kwikpak Fisheries, a wholly owned seafood processor, YDFDA pumped $3.8 million into the region and employed more than 800 resident fishermen, processing plant workers, and other staff in 2008. The YDFDA has provided financial support to the Alaska Department of Fish and Game for various projects, including the operation of the Pilot Station sonar project that is used as an index of the number of salmon returning to the Yukon River. The YDFDA's regional fisheries manager, Eric Olson, chairs the NPFMC, giving YDFDA and the other CDQ groups an important voice in Council decisions. In 2000, YDFDA bought into the mothership *Golden Alaska*, of which it currently owns 30.3%, and the catcher vessels *American Beauty* and *Ocean Leader*, of which it owns 75%. Both of these catcher vessels deliver to the *Golden Alaska*. In 2008, YDFDA leased its A season CDQ pollock share to the *Golden Alaska*, and its B season CDQ pollock share to American Seafoods. This has varied throughout the 2000s, as YDFDA has typically leased between 70% and 100% to the *Golden Alaska* (DeMarban 2009; YDFDA 2009).

The CBSFA is the smallest CDQ, representing one community, St. Paul. The CBSFA received 5% of the pollock CDQ allocation in 2009. Like YDFDA, CBSFA increased revenues in 2008 ($18.1 million) relative to 2007 ($16.1 million). The CBSFA doubled education and outreach activities in 2008, paying out $373,100. The CBSFA has an ownership stake in American Seafoods of slightly more than 4 percent. The CBSFA has partnered 75:25 with UniSea in ownership of the catcher vessels *Starward* and *Starlite*. The CBSFA also holds a 30% share of the catcher vessel *Fierce Allegiance*; all three of these vessels deliver pollock to UniSea (American Seafoods Group LLC 2002; American Seafoods Group LLC 2006).

The many partnerships formed between CDQ groups and pollock fishing companies make sense for several reasons. For CDQ groups, investment in pollock operations was one of the few options available under the initial program constraints. Many of the other local fisheries and associated facilities have lacked the catch share structure of the pollock fishery and have been considerably less profitable. Especially since passage of the AFA, pollock royalties and profits from ownership of AFA-qualified vessels have been strong. Control of CDQ shares has provided leverage in negotiations with pollock companies; ownership stakes in those companies has benefited from the security of control of CDQ shares. Another benefit is that members of CDQ communities are typically given hiring preference aboard partner vessels.

For the pollock operations themselves, partnering with CDQ groups has provided access to financial and political capital. The CDQ entities have typically held large cash positions and must invest 80% into fishery projects; as a result, CDQ entities were willing to pay a premium for ownership in the profitable pollock fishery. When Røkke needed to reduce his stake in American Seafoods to comply with AFA requirements, the natural place to turn was to CDQ entities that had leased quota shares to American throughout the 1990s. Not only did the CDQs provide financial resources, but there was an expectation that their ownership interest would lead the CDQ entities to provide their partners with priority access to pollock CDQ share leases. Another benefit of ownership is that it provides the pollock fishery clout when faced with political issues. For instance, when the fishery was under an immense amount of political pressure over salmon bycatch, CVRF brought in large numbers of community members to testify to the NPFMC in support of the pollock fleet, under the mantra “Pollock Provides!”

Fisheries Management under the American Fisheries Act

The formation of cooperatives has given members of the pollock fishery an increased sense of ownership not felt under the race-for-fish. In the pre-AFA fishery, pollock operations supported responsible management, but their attention remained focused on catching as much fish as possible before the TAC for the season was exhausted. They did not know how many fish they were going to catch or how they were to be caught; instead, they knew that if they did not catch them, someone else would. Under the AFA, companies were given a permanent stake in the pollock resource. Their access to dedicated shares of the pollock TAC was guaranteed and they knew that with proper management, there would be fish for them to harvest in subsequent years. With their rights to fish in place, pollock operations had a vested interest in the health of the fishery. Pollock operations now have an increased ability to respond to issues related to the Bering Sea ecosystem, such as issues with Steller sea lions and salmon bycatch. Proper conservation and management of the entire ecosystem becomes imperative to protecting their catch share. As a result, fishing operations have taken a more active role in the management process, seeking out areas of concern and actively looking for methods to address them. Pollock fishermen discuss their role as “co-managers of the fishery.”

Steller Sea Lion Closures

One of the first crises for the industry after AFA implementation was occasioned by the need to adapt to fishery management measures mandated under the Steller sea lion revised final reasonable and prudent alternatives (NMFS 1999a). Populations of Steller sea lions had been in decline for over 20 years despite numerous actions taken to stem the decline. In 1990, NMFS had published an emergency rule, listing Steller sea lions as a threatened (not endangered) species under provisions of the Endangered Species Act (ESA). This provided greater protection to Steller sea lions and gave them higher priority when determining policies involving their surrounding environment.

Since pollock is a part of the Steller sea lion diet, concern arose that localized depletion near the sea lion rookeries and haulouts might be contributing to the decline. In 1991, the effort to divide the pollock fishery into an A and B season to spread the harvest out over time was partially motivated by concern for sea lions. By leaving time between the A and B season, and setting an ending date for the B season of 1 November, the idea was to prevent compression of pollock fisheries and to decrease the chance of localized depletion of prey for Steller sea lions. Another measure, the ban on roe stripping, was passed, in part, due to concerns that the discarded carcasses attracted sea lions to the fishing grounds where they were vulnerable to entanglement in the fishing gear or to being shot by fishermen. Trawl closures were also implemented in 1991 to reduce disturbance of sea lions within 10 nm of 27 rookeries, with some of the trawl closures extended to 20 nm during the pollock A season. In addition, the domestic Bogoslof Island pollock fishery was closed due to resource conservation concerns, although they were again not solely related to sea lions (National Research Council 2003).

It is unclear whether these management actions have had any impact on the trajectory of the Steller sea lion population. By 1996, the sea lion population had declined to 20% of their levels in the 1970s. The NRC (2003) report recommended that to reverse declines, fishing effort should be more evenly distributed in time and place. The continued decline also led to the Steller sea lion populations west of 144° W being listed as endangered in 1997. By moving the status of this population from threatened to endangered, the priority given to these populations was increased substantially and further action to protect them was required (National Research Council 2003).

In April 1998, Greenpeace filed a complaint in U.S. District Court that NMFS had failed to revise the Environmental Impact Statement (EIS) relating to federal groundfish fisheries in Alaska and had violated the ESA because the biological opinion regarding the impact of these fisheries on sea lions was inadequate. NMFS released a new biological opinion in December 1998 (known as BiOp I), which concluded that the groundfish fisheries, excepting pollock, were unlikely to cause harm to listed species. For the pollock fishery, there was concern based on possible competition between the fishery and sea lions for pollock (NMFS 1998). In response to this finding, a set of Reasonable and Prudent Alternatives (RPAs) was developed in consultation with the NPFMC that spread fishing effort out (NMFS 1999a). Several restrictions were implemented that affected the pollock fishery. In 1999, trip limits were imposed for the pollock fishery in the Gulf of Alaska. In addition, pollock fishing in the Aleutian Islands was prohibited, with pollock catches in other critical areas being further restricted. Four fishing seasons were created for pollock to further spread the harvest out over time (National Research Council 2003).

These restrictions were implemented in the 1999-2000 fishery management plans. After the RPAs went into effect in January 1999, NMFS issued another biological opinion (BiOp II), which examined the effects of the entire groundfish fishery management plan on sea lions and found no danger from the pollock fishery based on a review of the TAC levels proposed for the GOA and BSAI management areas (NMFS 1999b). In response, Greenpeace filed suit and on 9 July 1999, US District Court Judge Thomas Zilly found the RPAs to be arbitrary and capricious because there was no explanation of how the proposed restrictions mitigated jeopardy for the Steller sea lion. He also felt that the environmental impact statements were insufficient and directed NMFS to prepare a more comprehensive analysis of the Bering Sea, Aleutian Islands, and Gulf of Alaska groundfish fisheries (National Research Council 2003).

In addition, in January 2000, Judge Zilly ruled that the "no jeopardy" finding in BiOp II was inadequate under ESA because it only considered the TAC levels for individual groundfish fisheries and failed to consider the cumulative impacts of all groundfish fisheries on sea lion populations. Based on that January ruling, Greenpeace filed for an injunction to prohibit groundfish trawling in Steller sea lion critical habitat until a new comprehensive biological opinion was prepared by NMFS. The injunction was granted in July and implemented in August 2000 (National Research Council 2003).

The growing number of Steller sea lion measures impacted when, where, and how the pollock fishery could occur. Many of the areas that were closed to trawling had been prime fishing grounds for the catcher vessels based in Unalaska and Akutan. That left two options: going further out for fish or increasing effort on areas close to town that were still open. With a lack of hard science either proving or disproving the link between pollock fishing and the decline of the Steller sea lion populations, industry members were concerned that continued pressure from environmental groups would further threaten operations if issues were not scientifically addressed. To address these and other environmental concerns through scientific research, the PCC formed the Pollock Conservation Cooperative Research Center (PCCRC) to fund an endowment to the University of Alaska Fairbanks to be administered by the Dean of the School of Fisheries and Ocean Science and to support research on science matters related to the groundfish fisheries off Alaska.

As the pollock industry became more involved in the science of the interactions between fishing activities and sea lion populations, a new biological opinion (BiOp III) was released (NMFS 2000). It concluded that the possibility that Steller sea lion populations were jeopardized by the Alaska groundfish fisheries, including fisheries for Atka mackerel (*Pleurogrammus monopterygius*), Pacific cod, and pollock, due to competition for prey and modification of prey distribution in critical habitat could not be dismissed. This revised biological opinion found jeopardy with regard to pollock even under the restrictions imposed by the 1999 RPAs. The opinion included a comprehensive set of new RPAs that incorporated adaptive management to assess the efficacy of the groundfish restrictions. The western population was divided into 13 management areas designated as either open- with fishing allowed under the 1999 restrictions-or closed- with no fishing allowed in critical habitat (National Research Council 1999).

The effects of the proposed regulations would have been substantial. A simulation posted in the Federal Register estimated the impact of implementing the measures would have cost the industry between $225 and $401 million annually, which is an estimated 40% of the annual value of the fishery (Department of Commerce 2001). With the measures neither seeming reasonable nor prudent, the pollock industry once again turned to their ally, Senator Stevens. His response was swift and effective. He attached an amendment to the December 2000 omnibus appropriations bill that delayed full implementation of the RPAs and provided the NPFMC with an opportunity to develop an alternative set of RPAs. In addition, the amendment provided $30 million for economic relief to offset losses incurred by sea lion protection measures, $28 million for research on the causes of the decline of sea lions, and $2 million for scientific review of BiOp III, including a review by the National Academy of Sciences (National Research Council 2003).

As a result of these actions, in February 2001, the NPFMC appointed an RPA committee to develop alternatives to the RPAs in BiOp III that addressed potential issues of the pollock, Atka mackerel, and Pacific cod fisheries but in a manner that could result in a less severe impact on the fishing industry and fishery dependent communities. In June, the RPA committee proposed an alternative set of measures that discarded the earlier adaptive management approach and used new telemetry data to justify restricting fishing primarily in the first 10 nm of the 20 nm radius, thereby delineating the highly restrictive critical habitat areas. This decision was based on telemetry data suggesting that sea lions spend most of their time at sea within 10 nm of the rookeries. The revised RPAs assumed that the telemetry data reflected the foraging behavior of sea lions, and therefore, a 10 nm zone would create the desired effect while allowing the fisheries to continue to operate. By moving most fishing activities beyond 10 nm, with some further restrictions between 10 and 20 nm, the RPA committee was able to reach the same theoretical reduction of jeopardy postulated under measures recommended in BiOp III. In August 2001, NMFS released BiOp IV, which evaluated the new RPAs and included a supplemental environmental impact statement that compared the various RPAs. NMFS concluded in BiOp IV that the June 2001 RPAs provide adequate protection for Steller sea lions with regard to the groundfish fisheries (NMFS 2001a; National Research Council 2003).

Although a near disaster for the pollock fleet was averted, the cause of the decline of the western stock of Steller sea lions has continued to be the subject of much speculation and debate despite numerous analyses and many detailed reports. The $30 million spent through Senator Steven's earmark and countless other studies sponsored by the North Pacific Research Board, the PCCRC, and various state and federal agencies have left scientists with more questions than answers. The story of Steller sea lion decline, which might otherwise have remained an obscure biological mystery, became an issue of national interest because of the regulatory implications for management of the commercial fisheries in the North Pacific.

Salmon Bycatch

Managing salmon bycatch in the BSAI pollock fishery has been a perennial challenge. Concern about surreptitious targeting of salmon was, in part, behind the requirement for onboard federal fisheries observers in the foreign and JV fisheries. An overall bycatch cap of 55,250 Chinook salmon (*Oncorhynchus tshawytscha*) was set for BSAI area foreign trawl fisheries in 1982 (NPFMC 1982b). Salmon bycatch and concern about salmon bycatch continued during the "Americanization" era, throughout the Inshore/Offshore debates, and continues in the post-AFA epoch (Witherell et al. 2002).

The trouble with Chinook salmon and chum salmon (*O. keta*) bycatch is that it has varied substantially from very low numbers in some years to very high numbers in other years (Figure 1.27, Figure 1.28), and has even varied substantially from month to month in the same year. In addition, bycatch has varied substantially and unpredictably from one region to the next within and between years. Consequently it has been difficult to predict how much bycatch will occur, or when and where it will occur, let alone design management measures that are likely to be successful without requiring draconian changes in the organization of the pollock fishery.

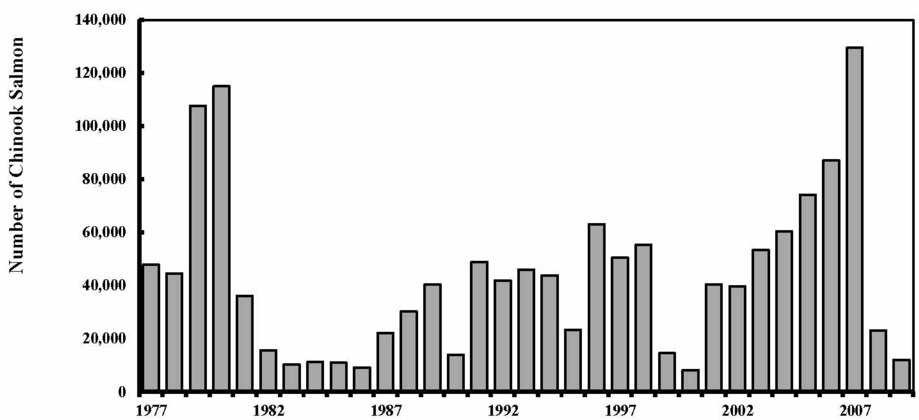

Figure 1.27. Chinook salmon bycatch by pollock vessels in the BSAI.
Source: Data for 1977-1990 from Queirolo et al. (1995); data from 1991- 25 August 2009 from NMFS (2009a).

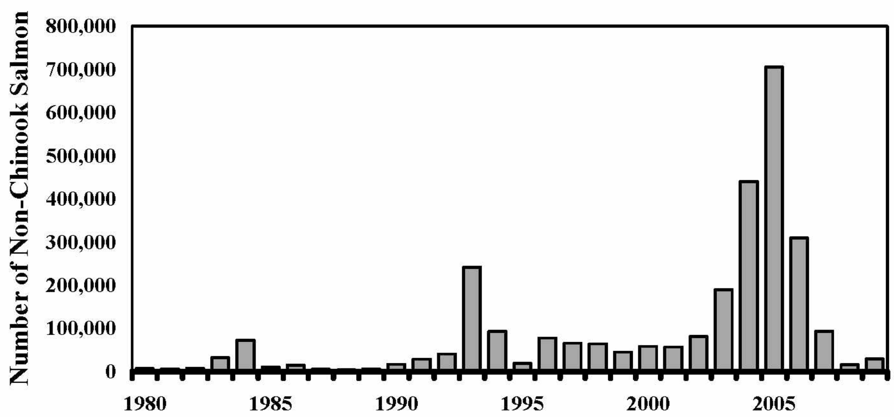

Figure 1.28. Non-Chinook (mostly chum) salmon bycatch by pollock vessels in the BSAI.
Source: Data for 1977-1990 from Queirolo et al. (1995); data from 1991- 25 August 2009 from NMFS (2009b).

During the 1980s, the annual overall Chinook salmon bycatch cap was apportioned to foreign nations engaged in the TALFF and JV fisheries; nations that exceeded their cap were prohibited from fishing in large sections of the Bering Sea during the remainder of the year (NPFMC 1983b, NPFMC 1984, Witherell and Pautzke 1997). As early as the January 1989 NPFMC meeting, Henry Mitchell proposed setting a schedule of ever more restrictive prohibited species bycatch limits on incidental catches of salmon by domestic catcher boats engaged in the fall Shelikof Straits pollock fishery. Beginning in 1992, the Council experimented with an individual vessel incentive program (VIP) to reduce prohibited species bycatch (NMFS 1993). However, concerns about due process and the accuracy of bycatch estimates left the VIP program so inefficacious that is was rescinded in 2008 (NMFS 2008).

The Council switched to a spatial management approach in 1995 and established the Chinook Salmon Savings Areas (NPFMC 1995b) and the Chum Salmon Savings Area (NPFMC 1995c). These seasonal closure areas encompassed fishing grounds that had consistently experienced high Chinook salmon and non-Chinook salmon bycatch rates.

Additional management measures modified the closure areas to depend on total bycatch and bycatch rates (NMFS 1999c).

In 2001, the PCC and the catcher vessel cooperatives formed an inter-cooperative group to devise a voluntary strategy to reduce bycatch of non-Chinook salmon. The plan excluded vessels with high bycatch rates from fishing for pollock in areas that reported elevated chum salmon bycatch. This program exemplifies the type of voluntary coordination that can occur among the AFA cooperatives and could not have occurred in the pre-AFA fishery (NMFS 2002). With this example in mind, and with the observation that bycatch rates outside the salmon savings areas often exceeded bycatch rates inside the salmon savings areas, NPFMC approved a system of dynamic spatial closures that allowed managers to shut off high-bycatch areas in near real time, measures made possible by the heightened observer coverage requirements imposed by the AFA (NPFMC 2005, NPFMC 2007). An exemption to area closures for vessels participating in the voluntary rolling hotspot system (VHRS) was implemented in 2006 and 2007 through an exempted fishing permit and, beginning in 2008, through Amendment 84 to the BSAI FMP (NPFMC 2008). Nevertheless, despite all of these measures, the bycatch Chinook reached 121,638 in 2007 (Figure 1.27) and the bycatch of non-Chinook salmon exceeded 700,000 in 2005 (Figure 1.28).

The record bycatches of non-Chinook salmon in 2005 and of Chinook salmon in 2007 raised concerns in western Alaska where Chinook salmon runs have declined since 1996. To address these concerns, in 2008, the NPFMC initiated review of an amendment to the BSAI groundfish Fisheries Management Plan to reintroduce binding annual caps on Chinook salmon bycatch and to create an incentive to minimize Chinook salmon bycatch at levels below the bycatch cap (NPFMC 2008). Under the Council's preferred alternative, beginning in 2011, the AFA cooperatives can choose to operate subject to proportionate shares of a simple bycatch cap of 47,591 Chinook salmon or proportionate shares of a less restrictive bycatch cap of 60,000 Chinook salmon if they adopt an incentive plan agreement (IPA) structured to create vessel-level incentives to avoid bycatch even when the cap is non-binding and as long as actual bycatch is below 47,591 in at least four out of seven years. The bycatch caps will be apportioned to the AFA cooperatives or sectors based on a formula that weights past catches of pollock and past bycatches of Chinook salmon and apportioned 70:30 between the A and B seasons for pollock (NPFMC 2008). The AFA cooperatives have explored several options for structuring one or more IPAs but have not yet established an IPA for salmon bycatch avoidance.

United Catcher Boats and the PCC have also experimented with technical methods for reducing salmon bycatch. For example, the PCC has helped support field trials of second-generation flapper-panels. These were tested in the 2008 B-Season aboard the *Northern Jaeger* and the *Arctic Fjord*. The initial results indicate that there has been an improvement on Chinook bycatch in relation to fishing performance of the nets, though more testing was needed (Pollock Conservation Cooperative 2008). Nevertheless, John Dooley, who has fished BSAI pollock for over 25 years, claims there "are lightning strikes," or times of high abundance. He recalls tows of 1000 salmon, which cannot be avoided if your vessel is the first one on the fishing grounds (J. Dooley, personal communication).

Although bycatch can be thought of as a biological or technological issue, it has important social and economic ramifications. Setting a bycatch cap for salmon involves implicit and uncertain tradeoffs between fisheries for salmon and fisheries for pollock. Liberal bycatch allowances increase the magnitude of likely losses to the directed salmon fishery; small bycatch allowances may prevent full exploitation of the pollock fishery. In addition, bycatch caps can have different impacts on different segments of a fishery. For example, to the extent that bycatch rates are inversely related to distance from Unalaska and Akutan, they have a larger impact on the inshore fleet than they do on the offshore fleet. Similarly, within the inshore fleet, salmon bycatch caps can have a larger effect on smaller vessels with limited operating ranges or on vessels that focus on harvests of large pollock for fillet production.

Decline in Russian Stocks

While AFA cooperatives have had an important impact on the fishery, their success was aided in part by a sharp reduction in pollock biomass in Russian waters. The Russian fleets had depleted the resources off their coast through overfishing, much of it unreported. As a result, the harvests of pollock in Russia had been decreasing steadily since 1988, when catches were over 3.3 mmt. By 2002, Russian catches had dropped to less than 25% of their 1989 level, with reported catches of less than 850,000 mt (Figure 1.29). Russia had historically produced a majority of the global supply of pollock fillets, but the drop in catch created a shortage that drove prices up. Between 1998 and 1999, the first year of the AFA, average pollock fillet prices increased 41% to 74%, depending on the type of fillet (GAO 1999). The increase in prices corresponded nicely with the passage of the AFA, which further increased the value of the pollock fishery to its participants.

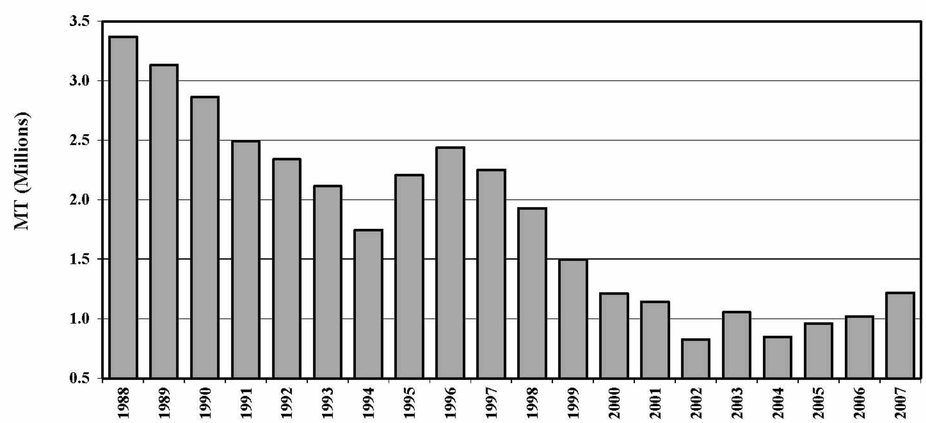

Figure 1.29. Annual Russian catches of pollock, 1988-2007.
Source: UN FAO (2009).

The Future of the Pollock Fishery

The passage of the AFA has proven to be a boon for the U.S. pollock industry, providing both improved management stability and increased economic benefits for fishery stakeholders. Pollock companies, once engaged in a Hobbesian struggle for catches, are now able to focus on harvesting and processing. Pollock operations have been able to maximize their revenues by focusing on the most profitable product forms demanded at the time. Global markets have expanded, allowing firms to look beyond Japan for roe and surimi sales, and the U.S. for fillet sales. Increased demand from Europe and other markets has allowed pollock processors to maintain a diversified portfolio of buyers, allowing operations to maintain profitably when prices remain low for one product or in one region. Additionally, pollock operations have been able to afford much needed capital investments, and when needed, have been able to turn to capital markets to provide needed financing.

The U.S. pollock fishery has also been able to respond to environmental and management concerns related to their fishery since the AFA was passed. From issues that include Steller sea lion population declines and salmon bycatch, they have responded to concerns from affected parties. The increased profitability within the pollock industry has allowed members to sponsor studies from impartial third parties that provide scientific answers to issues facing the Eastern Bering Sea. Furthermore, the industry has been able to comply with management actions that have resulted in increased expenses.

The future of the pollock fishery, however, holds many questions. Although the fishery is in an unparalleled period of stability, where fishing operations have been given increased flexibility and have responded with increased responsibility, the future under the AFA as it is currently structured is less clear. One of those looming issues may be the geographic distribution of the Alaska pollock biomass. Pollock populations appear to have shifted farther north towards Russian waters, enough so that Andrei Kraini, the chief of the Federal Agency for Fishery in Russia has speculated that:

> The warming of the climate will be to our advantage…Because of this, 35 percent of Alaska pollock will migrate from the U.S. part of the Bering Sea to colder waters, towards our coasts. So the U.S. plans to lower the catches, while we have sizably increased the fishing quota. (Sackton 2009)

The spatial shifts in pollock biomass may have contributed to stock assessment findings that led to the historically low TAC of 815,000 mt in 2009.

The principal effects of shifts in pollock biomass are changes in the distance U.S. pollock vessels must travel to catch fish. The further the center of biomass shifts towards the boundary between U.S. and Russian EEZs, the farther pollock fishermen have to journey to catch their fish, thereby increasing the costs associated with harvesting the fish. Furthermore, these travel distances can also be increased by management actions, and with recent and future fishery management actions related to salmon bycatch and Steller sea lions, there is little hope that fishing vessels will be spending more time fishing near shore.

These current and future management actions may pose additional issues than just traveling farther. It remains to see how the Chinook salmon bycatch incentive plan will affect the fishery when it is implemented in 2011, with future management actions aimed at reducing chum salmon bycatch also in development. There is still continued debate on how pollock affect Steller sea lion populations, since the sea lions have failed to rebound as biologist had hoped. With increased public debate on both these topics, the pollock fishery continues to provide a popular scapegoat for concerned parties. It remains to be seen how the pollock fishery will be affected by potential management actions going forward.

These issues, combined with rising fuel costs, will continue to pressure the pollock fishery. The real price of diesel in Dutch Harbor tripled from 1999 ($1.31) to 2008 ($4.34) (Figure 1.30). This negatively affects all the three sectors through increased costs, but disproportionately affects inshore catcher vessels. Inshore catcher vessels are already traveling farther from the shore to the fishing grounds during the B season, with the average distance increasing from 2003 to 2008 from 70 nm to 196 nm (Figure 1.31). With higher fuel costs and no corresponding increase in pollock value, the inshore sector left 10% of their 2007 B season quota in the ocean, even as the at-sea sector continued to pay over $300 per mt to harvest CDQ fish, an outcome that is inconsistent with MSFCMA National Standard 1 or National Standard 5. Salmon bycatch measures combined with anticipated increases in fuel costs will continue to squeeze the profitability of the inshore sector during the B season, potentially forcing the sector to leave fish in the water in future seasons (The A season is at much less risk due to roe production).

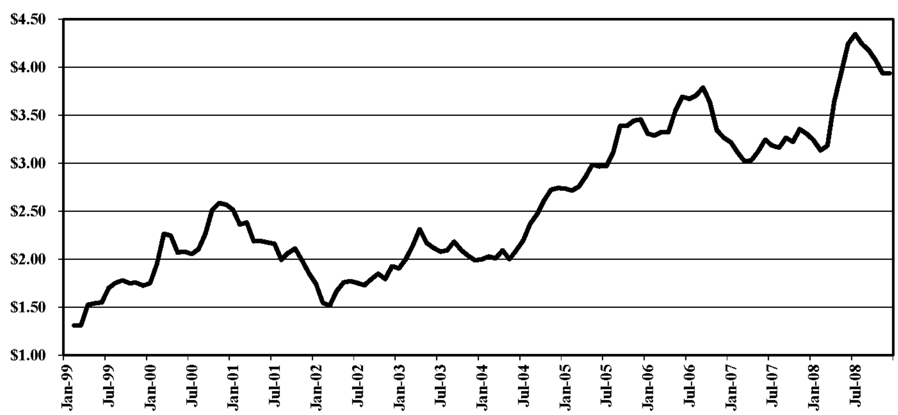

Figure 1.30. Real monthly #2 marine diesel price ($/gal) in Unalaska region, February 1999 – December 2008.
Source: Fisheries Economics Data Program (2009).

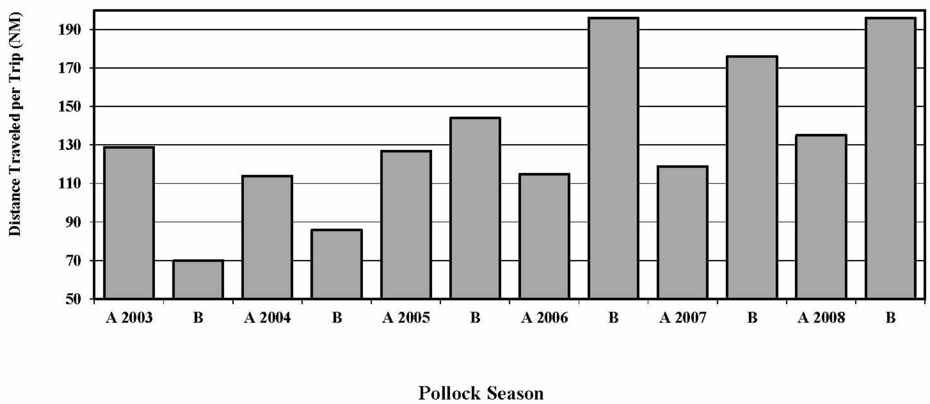

Figure 1.31. Average distance travelled per inshore catcher vessel trip, 2003-2008. Source: S. Lewis, personal communication.

Discrepancies in profitability across sectors expose the limitations of the AFA. The Act has provided an immense amount of flexibility – but only to the point it does not conflict with the framework established under the AFA. While it may be advantageous for pollock operations to transfer or lease fish between sectors, rather than leaving it in the water, the AFA has handcuffed the NPFMC from adopting any policies that conflict with the Act without further changes from Congress. And although large amounts of fish have not been left in the water since 2007, increasing Russian catches, rising fuel prices, and management actions intended to facilitate Steller sea lion recovery or reduce salmon bycatch increase the likelihood that portions of the B season inshore sector allocation may be left unharvested.

If history is a guide, one might assume that if the inshore and at-sea sectors desired to add flexibility to the AFA, they could importune Congress. But the titans who crafted the AFA are no more and none have risen to fill the resulting void. Moreover, the sectors have become comfortable with the predictability and profitability of the status quo and are reluctant to risk reopening old wars. For example, John Dooley notes that there are several components of the AFA which he would change, but he adamantly opposes opening the door for any changes to the current legislation (J. Dooley personal communication). It seems that even after more than a decade, the battle that preceded the passage of the AFA remains fresh. The at-sea sector would be expected to oppose changes to the AFA, unless the changes allowed for an increased share of the TAC or the at-sea sector felt it more beneficial to lease quota from the inshore sector than to leave portions of the inshore quota unfished. That is, the at-sea sector might benefit more from increased product value and larger market share if a portion of the inshore sector's B season quota was left unfished than it would gain from leasing the unfished quota shares. Moreover, the inshore sector would likely strongly oppose any changes that fail to protect their current allocation of fish, making any industry sponsored changes unlikely.

There are also numerous other factors outside the control of the AFA fisheries that could play into any possible AFA changes. For instance, although one sector may not care if some fish from another sector are left in the water, it could be expected that if pollock allocation were consistently left unfished and no changes were implemented, it would be construed as a violation of the MSFCMA standard that requires fisheries be managed in a manner "which will provide the greatest overall benefit to the nation with particular reference to food production". Another issue that would have to be considered is the impact of any action on outside fisheries, since a shift in the overall profitability of the inshore sector would affect more than just the pollock operations. Economies of scale and prosperity founded on the pollock fishery has allowed shore-based processors to continue processing other species that often barely cover their costs, and are sometimes even subsidized by pollock profits (L. Cotter personal communication). This is especially true for some of Alaska's salmon fisheries, such as Trident's salmon operations (D. Abbasian personal communication).

With the NPFMC and pollock operations lacking both the motivation and legal authority to institute changes to the AFA, the pollock fishery may see change instigated from a new source. In the same way that the MSFCMA paved the way for 'Americanization' of the BSAI groundfish fisheries, creation of the CDQ program has paved the way for 'Alaskanization' of these fisheries. The Inshore/Offshore amendments were proxy battles between Seattle-based Japanese and Norwegian interests that were largely won by the Japanese aligned inshore sector. The AFA armistice secured the inshore sector's gains but gave both sectors opportunity to thrive. In contrast, the CDQ program was designed to transfer benefits to actual Alaskans. In the early 1990s, Alaskan ownership in the BSAI pollock fishery was negligible; owners were either foreign, with a majority from Japan, Norway, or Korea, or residents of the contiguous U.S., especially Washington, Oregon, and California (NPFMC 2002; Hornnes, 2006; J. Dooley, personal communication). Both inshore and offshore sectors hired their fishing and processing crews from the Pacific Northwest or from outside the U.S. Most companies in both sectors purchased supplies in the Pacific Northwest and shipped them to storage facilities in Unalaska and other ports near the fishing grounds. Nearly all revenues generated in the fisheries flowed out of the state (Miller et al. 1992; NPFMC 1992; Herrick et al. 1994).

It seems that with their increasing ownership positions, CDQ groups may have the incentives in the future to advocate for changes to the AFA. CDQ entities, through the CDQ allocation and their ownership stakes in AFA-qualified factory trawlers, motherships, and catcher vessels, controlled nearly 257,167 mt—nearly 26%—of the one million mt pollock TAC in 2008 (Figure 1.32). Their impact has been especially evident in the catcher/processor sector, where 32.7% of the catcher/processor DPA is controlled by CDQ entities (Figure 1.33). If CDQ pollock harvested by the catcher/processor sector is included for 2008, the percentage of CDQ control in the sector increases to 47.1%, giving CDQ entities control of nearly half of the catcher/processor sector pollock harvested. The royalties and profits earned by CDQ entities flow back into western Alaska, benefitting the communities closest to the fishing grounds.

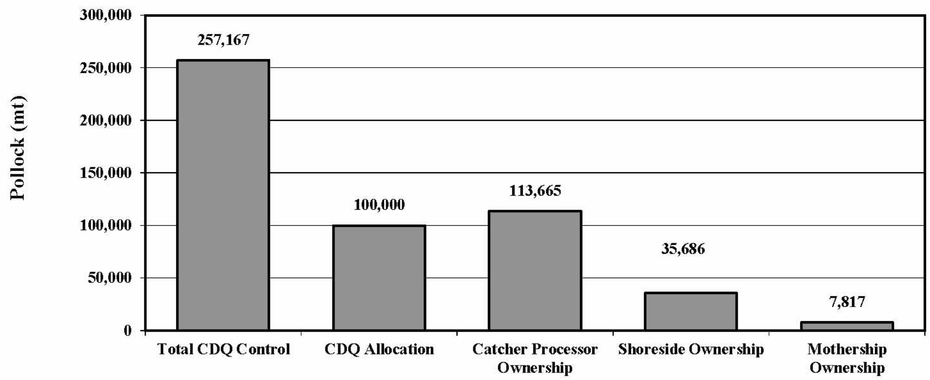

Figure 1.32. CDQ ownership in the pollock fishery in 2008 (mt).
Source: APICDA (2009); BBEDC (2009); CBSFA (2009); CVRF (2009); NSEDC (2009); YDFDA (2009).

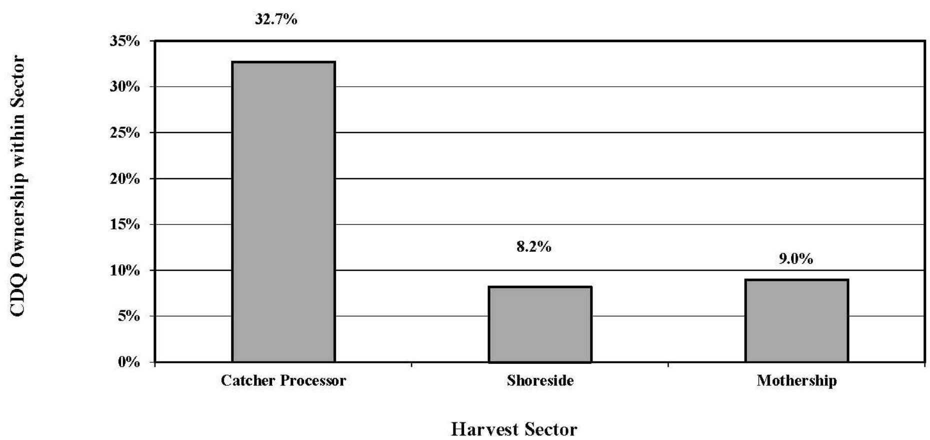

Figure 1.33. Percentage of harvest owned by CDQ groups, 2008.
Source: APICDA (2009); BBEDC (2009); CBSFA (2009); CVRF (2009); NSEDC (2009); YDFDA (2009).

It is interesting to note, however, that CDQ entities have established a stronger equity position in the at-sea sector than they have in the inshore sector. The CDQ entities hold major and often majority equity shares in every PCC company except Trident and they have a similarly large equity position in one of the three mothership fleets. In contrast, CDQ investment in the inshore sector has been limited to ownership of a few catcher vessels; shore-based pollock processors have not solicited investment from the CDQ entities and because Trident and the Japanese seafood companies are large, diversified companies with ready access to financial capital, they have had little need for access to CDQ capital and they have been largely immune to unsolicited ownership bids. Moreover, because the inshore sector has been unable to match the high prices that the at-sea sector has offered for CDQ pollock leases, the CDQ groups have had little incentive to offer their pollock quota shares as assets to be tied to an ownership stake with companies in the inshore sector.

As CDQ groups continue to look for new investments, the opportunities available within the fishery sector continue to shrink. With few opportunities in the inshore sector, it may be advantageous for the CDQ groups to push for the expansion of the offshore allocation, thereby opening access to a larger portion of the TAC. This would not only benefit their operations from increased royalties and investment returns in the at-sea sector, but it may also increase investment opportunities in both sectors. In turn, it would likely continue to increase the Alaskanization of the pollock fishery through increased ownership, employment opportunities, and expanded revenues. The NPFMC remains dominated by an Alaskan majority, which means potential decisions affecting the fishery are likely to swing in favor of a CDQ-owned at-sea sector that was disadvantaged during the inshore/offshore wars. The largest difficulty CDQ groups would face is changing the AFA, which has to come from an act of Congress. Although Congress has often acted favorably on issues pertaining to Alaska Natives, CDQ groups lost their number one ally in Senator Stevens. It will be interesting to see what, if any, actions take place regarding this issue in the future.

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Appendix 1A—Acronyms

ABC:	Allowable Biological Catch
AFA:	American Fisheries Act
AI:	Aleutian Islands EEZ
AP:	Advisory Panel
BiOp:	Biological Opinion
BSAI:	Bering Sea and Aleutian Islands EEZ
CDQ:	Western Alaska Community Development Quotas
CP:	Catcher/processor
CPC:	Comprehensive Planning Committee
CRP:	Comprehensive Rationalization Plan
CV:	Catcher Vessel
CVOA:	Catcher Vessel Operational Area
DAP:	Domestic Annual Processing
DPA	Directed Pollock Allocation
EBS:	Eastern Bering Sea EEZ
EEZ:	Exclusive Economic Zone
EIS:	Environmental Impact Statement
FCMA:	Fishery Conservation and Management Act
FMP:	Fishery Management Plan
FT:	Factory Trawler
g:	gram
gal.:	gallon
gpd:	gallons per day

gph: gallons per hour

GOA: Gulf of Alaska EEZ

ICA: Individual Catch Allowance

IPA: Incentive Plan Agreement

ITQ: Individual Transferable Quota

IPQ: Individual Processor Quotas

JVP: Joint Venture Processing

k: knots

kg: kilogram

kph: knots per hour

MFCMA: Magnuson Fishery Conservation and Management Act

MSFCMA: Magnuson-Stevens Fishery Conservation and Management Act

MS: Mothership

MSY: Maximum Sustainable Yield

mt: metric ton

mmt: million mt

nm: nautical mile

NMFS: National Marine Fisheries Service

NOAA: National Oceanic and Atmospheric Administration

NPFMC: North Pacific Fishery Management Council

OY: Optimum Yield

PCCRC: Pollock Conservation Cooperative Research Center

SSC: Science and Statistical Committee

TAC: Total Allowable Catch

TALFF: Total Allowance Level of Foreign Fishing

VHRS: Voluntary Rolling Hotspot System

Appendix 1B—Interviews and Correspondence

Dave Abbasian is the plant manager of the Akutan processing plant for Trident Seafoods. He has worked his way up the company ladder and has been employed with Trident for over 25 years. Mr. Abbasian provided a tour of the Akutan processing plant, interviews, and e-mail and phone correspondence.

Alec Brindle is the former owner of Wards Cove, a major seafood processing company that operated in Alaska for 75 years. Wards Cove formed a partnership with two Japanese companies to form Alyeska Seafoods Corporation, a large pollock processing plant, and has maintained ownership in several of the vessels that delivered to it. He was involved in the Council process and testified for the inshore sector on numerous occasions. Mr. Brindle was interviewed at a United Catcher Boat luncheon in Seattle.

John Bundy, a Seattle attorney, has been involved with the Glacier Seafoods since its inception in 1982. He original represented the company as an attorney during the construction of the *Northern Glacier*, joined full-time in 1993, and continued as President. He worked to establish the Pacific Whiting Conservation Cooperative in 1997 and the Pollock Conservation Cooperative in 1998, and was a voting member of the NPFMC from 1999-2008. Mr. Bundy provided an interview in March 2009.

Doug Christensen is President of Arctic Storm Management Group. He started with Arctic Storm, Inc. at its inception in 1986, became President in 1995, and remained President when the company became Arctic Storm Management Group after the passage of the American Fisheries Act. He has been the President of the U.S. Surimi Commission since 1995. Mr. Christensen provided a personal interview and numerous e-mails.

Larry Cotter is the Chief Executive Officer for the CDQ group Aleutian Pribilof Island Community Development Association. He served on the Advisory Panel to the NPFMC for six years during the transition years from foreign fishing. After that, he served as a voting member of the Council for an additional six years in the 1990s during the inshore/offshore debates. During that time he was Chair of several committees including the Bycatch Committee and Crab Management Committee. Mr. Cotter provided an interview and a review of an early draft of chapter 1.

John Dooley is an owner and captain of two pollock catcher vessels, the *Pacific Prince* and the *Caitlin Ann*. He was involved in the original joint venture operations with the Russians off the coast of Oregon, before moving to the pollock fishery where he has fished since the early 1980s. Mr. Dooley allowed the author to ride along on a pollock fishing trip in summer 2009 and provided numerous interviews throughout that trip.

John Gruver is the Inter-Coop Manager for United Catcher Boats. He started fishing in pollock joint ventures in the early 1980s and has been involved in the fishery ever since. Mr. Gruver was interviewed at a United Catcher Boat luncheon in Seattle.

Jan Jacobs is Director of Government Affairs for American Seafoods Company. He has been working in the fishing industry since 1984, has been a member of the NPFMC's Advisory Panel since 2004, is President of the Pacific Whiting Conservation Cooperative, and is a Board member and officer for a variety of different industry associations. Mr. Jacobs provided two interviews for this project, numerous correspondences through e-mail, and a review of a preliminary draft of Chapter 1.

Bob King is a staff member for U.S. Senator Mark Begich, whom he advises on fishery issues. Mr. King spent 20 years as news director in Dillingham and then moved to Juneau where he was press secretary for Governor Tony Knowles. He wrote a history of Alaska's fisheries for the Alaska Department of Fish and Game for the state's 50th anniversary. Mr. King provided a review of a draft of Chapter 1.

Stephanie Madsen is the Executive Director of the At-Sea Processors Association, where she tracks fisheries management and policy issues statewide, regionally and nationally. Stephanie has been involved in fisheries off the coast of Alaska for over twenty years. She served with the NPFMC in variety of roles: on the Advisory Panel from 1993- 2001; as a voting member from 2001-2007; and Chairwoman from 2003-2007. Ms. Madsen provided an interview and e-mail correspondence for this project.

Paul MacGregor is a partner in the Seattle law firm of Mundt MacGregor. He has represented a number of pollock catcher processor companies and related trade organizations for more than 25 years; and has regularly attended and spoken at NPFMC meetings since 1978. Mr. MacGregor provided an interview on March 2009.

William Myhre is a Washington, D.C. attorney who has worked with closely with the pollock fishery since the 1980s in a variety of capacities. He has represented the pollock mothership and catcher processor sector with issues such as vessel registration, ownership requirements, and foreign rebuilt vessels. He has testified before Congress on a variety of issues related including the Anti-Reflagging Act and American Fisheries Act. Mr. Myhre provided a phone interview and various e-mail correspondences.

Brent Paine is the Executive Director of United Catcher Boats, a trade organization for pollock catcher vessels from Alaska, California, Oregon, and Washington. He formerly worked for the NPFMC and played an integral role in defending the rights of the catcher vessels during the American Fisheries Act debate. Mr. Paine provided an interview at a United Catcher Boat luncheon in Seattle.

Dr. Wally Pereyra is a Chairman of Arctic Storm Management Group. He was a groundfish scientist with the National Marine Fisheries Service before becoming a General Manager of the Marine Resources Company, a joint venture between the US and Soviet Union in 1977. Dr. Pereyra served for nine years as Vice Chairman to the North

Pacific Fishery Management Council during the Inshore/Offshore debates and the passage of the American Fisheries Act. He provided a review of Chapter 1.

Joe Plesha worked as Counsel to the Senate Commerce Committee for ocean issues during the mid-1980s and has been General Counsel and Chief Legal Officer at Trident Seafoods Corporation since 1987. He was involved with passage of the Anti-Reflagging Act, the North Pacific Fishery Management Council's adoption of the Inshore/Offshore pollock allocations, and passage of the American Fisheries Act. Mr. Plesha provided access to company documents and personal notes regarding these events, along with sharing his recollections through e-mail and interviews.

Wilt Sinclair is the plant manager for Alyeska Seafoods, a pollock processing plant in Unalaska. He provided an interview in Unalaska in August 2009.

Joe Sullivan is a partner in the Seattle law firm of Mundt MacGregor. He has been involved in Alaska fisheries as a fishermen, Mayor, and, currently, in a legal capacity. He provided an interview in March 2009.

CHAPTER 2: Institutional Structure and Revenue Maximization in the Eastern Bering Sea Pollock Fishery[1]

Abstract A simultaneous-equation equilibrium model of domestic and international markets for pollock (*Theragra chalcogramma*) fillets, surimi, and roe is used to examine the combined effect of variability in landings and changes in product mix on pollock first wholesale prices and revenues. The market for U.S. pollock products in the 1990s was focused mainly on selling surimi and roe to Japan. Since the passage of the American Fisheries Act, processors have increased product quality and product recovery rates, diversified their mix of product forms, and developed fillet and surimi markets in the U.S. and Europe. The model indicates that first wholesale revenues are maximized when pollock harvests are maximized. Strictures on transfer of allocations between sectors can lead to under-harvest when product prices are low, fuel costs are high, or when the most productive fishing areas are at great distances from shore-based processing facilities, especially when these conditions arise during the B season.

Introduction

The eastern Bering Sea (EBS) fishery for Alaska pollock (*Theragra chalcogramma*) yields gross exvessel revenues of over $300 million and a first wholesale value of over $1.2 billion. Over the last 30 years, annual Total Allowable Catch (TAC) has ranged from 813,000 mt to 1,494,900 mt, making the Alaska pollock fishery the largest tonnage U.S. fishery. During the 1960s and 1970s, Alaska pollock was largely harvested by a

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[1] Strong, J. and K.R. Criddle. 2011. Institutional structure and revenue maximization in the eastern Bering Sea pollock fishery. Submitted to *Marine Resource Economics*.

Japanese mothership fleet that extracted roe and processed the meat into surimi, a fish-based protein paste. A Russian mothership fleet produced a frozen headed and gutted (H&G) product destined for consumption in the Eastern Bloc. Passage of the Fishery Conservation and Management Act (FCMA) in 1976 stimulated an “Americanization” of the fishery. The 1980s and 1990s were characterized by rapid increases in the number of U.S.-flagged harvesters and catcher-processors and by development of extensive shore-based processing capacity. In the mid-1980s, the Total Allowance Level of Foreign Fishing was zeroed-out in favor of allocations to joint-ventures. By 1991, the joint-venture allocations were also eliminated to make room for harvesting by U.S.-flagged catcher vessels (CVs) that delivered to U.S.-flagged motherships or processing facilities in the U.S. and for harvesting by U.S.-flagged catcher-processors (CPs) and U.S.-flagged catcher vessels (CVs) that delivered to them. Continued increases in harvesting and processing capacity during the 1990s precipitated a race-for-fish and engendered heated political battles over allocations between the offshore (motherships, CPs, and associated CVs) and inshore sectors (Criddle and Macinko 2000). While a few processors invested in fillet technology, roe and surimi remained the primary products. Under the race-for-fish, it was not advantageous for processors to produce time intensive product such as fillets. Instead, they focused on high throughput production methods to accommodate the large volumes of catch taken in compressed seasons.

These conditions changed following passage of the American Fisheries Act (AFA) in 1998. The AFA established permanent sector allocation shares for each of the four sectors of the fleet and authorized members of the sectors to form harvesting cooperatives in which fishing operations privately negotiated contracts that guaranteed each vessel a portion of the TAC. The CP sector and CVs that delivered to them formed cooperatives in 1999. The CVs that delivered to inshore processors formed cooperatives in 2000, as did the CVs that delivered to motherships. The AFA also expanded the Western Alaska Community Development Quota (CDQ) program from an allocation of 7.5% of the EBS pollock TAC to 10% of the TAC for each EBS groundfish species. The six CDQ entities represent 65 western Alaska communities and were created to provide opportunities for community residents to benefit from wealth being derived from exploitation of EBS fishery resources. These groups have, until recently, leased their quota to AFA-qualified fishing vessels operating in the at-sea and inshore sectors. Under the AFA, pollock operations have enjoyed increased operational stability and increased revenues (Felthoven 2002, Fell 2008, Wilen and Richardson 2008, Morrison Paul, Torres, and Felthoven 2009). The AFA enabled processors to look beyond simply processing the largest amount of fish before the end of the fishing season and instead focused on maximizing revenues through increased capital expenditures into technology, expanded global markets, and optimized product mix.

While Hiatt et al. (2010) provides an excellent descriptive overview of pollock products and their markets, markets for pollock products have received very little attention in formal models. Sproul and Queirolo (1994) modeled Japanese household consumption of surimi in 1980, 1985, and 1990 and found statistically significant declines in consumption of surimi that they attributed to increases in household income and increases in the consumption of beef, pork, and chicken. Using data from 1986 to 1993, Herrmann et al. (1996) developed a simultaneous equation model of the Japanese demand for U.S. surimi, the U.S. supply of surimi to Japan, inventory holdings of surimi in Japan and the United States, and U.S. exvessel price for Alaska pollock. The study found that although surimi exports to Japan were unresponsive to changes in export price, exvessel demand was inelastic over the biologically plausible range of catches, implying that exvessel revenues could be maximized by harvesting the maximum permissible level of catch. Fell (2008) used cointegration methods to examine the responsiveness of pollock processors to changes in surimi and fillet prices before and after implementation of the AFA and found that price responsiveness increased in both the inshore and offshore sectors post-AFA. Morrison Paul, Torres, and Felthoven (2009) used a revenue function model to examine CP-sector choices of product form pre- and post-AFA and found that the mix of regular and deep-skin fillets, surimi, and roe was responsive to variations in product prices and to increased operational flexibility that followed implementation of the AFA. These choices of product form, in turn, affected operation choices related to tow duration, crewing, and vessel power.

This study uses monthly time series data from 2000-2008 to extend the single product-single market model of Herrmann et al. (1996) to a represent post-AFA demand and allocation of fillets, roe, and surimi to markets in Japan, Europe, and the U.S. This contrasts with the cointegration approach applied in Fell (2008) to identify structural breaks pre- and post-AFA and the revenue function approach used by Morrison Paul, Torres, and Felthoven (2009) to explicate the joint effects of product mix and productivity that arose from implementation of the AFA. Instead, this study uses a structural model of post-AFA markets to account for the effects of variability in landings and changes product demand on the mix of products produced, patterns of trade, and first wholesale prices and revenues. Comparative static simulations based on the estimated model are used to explore how changes in prices and product volumes may affect revenue.

Model Specification, Estimation, and Validation

U.S. production of pollock roe, fillets, and surimi and their demand in and allocation to markets in the U.S., Europe, and Japan were modeled using monthly data for 2000-2008. The model included nine behavioral equations. The five demand equations were specified as inverse (price-dependent) demands because, in a typical year, fishermen harvest the entire pollock TAC, which is exogenously determined, and global prices adjust to the quantity produced. Each demand equation includes per capita imports, substitute prices, and per capita income. The producer price index for intermediate foods and feeds was used to normalize prices to 2008 levels.

The supply of U.S. pollock was treated as a stochastic process moderated by variations in survival and growth, various environmental factors, and changes in harvests. The upper bound on U.S. pollock harvests (the TAC) is set by the U.S. Secretary of Commerce based on recommendations of the North Pacific Fishery Management Council

(NPFMC) which is, in turn, advised by a Scientific and Statistical Committee (SSC) invested with authority under the FCMA to set binding upper limits for the Acceptable Biological Catch and the Overfishing Level. The SSC acts as a peer review panel for stock assessments prepared by National Marine Fisheries Service staff who develop models that incorporate information from the fishery and fishery-independent surveys to estimate and project recruitment. While the pollock fishery occasionally harvests less than the TAC, landings are generally within a few percentages of the TAC, thus the supply of pollock is not well represented by a traditional supply function. Instead, the disposition of surimi to the U.S. and Japan, and fillets to U.S. and Europe were represented using four allocation equations that each considered own price, prices in competing markets, levels of production in the at-sea processing and shore-based processing sectors, and monthly seasonal variables. Additional variables, such as lagged quantities and competing product prices, were included in some of the allocation equations to account for variability due to other factors. The allocation of pollock roe to Japan was not estimated because, on average, the Japanese market buys over 95% of U.S. pollock roe production. Linear and nonlinear model forms were explored for each of the behavioral equations. The ultimate choice of functional form was based on goodness of fit for the individual equations and on performance of the overall equation system. Data sources used in the model are listed in Table 2.1. U.S. import and export statistics were obtained from the United States International Trade Commission, which maintains records of exports and import quantities and prices. Japanese imports and exports of roe and surimi, as well as Japanese consumption statistics and welfare measures, were obtained from Trade Statistics of Japan. European import and export statistics were obtained from the Eurostat database. Production data for the at-sea and inshore sectors of the U.S. pollock fishery were derived from the NMFS catch accounting system (Patty Britza NMFS/AKRO). Variable definitions and sources are listed in Table 2.2.

Market Clearing Identities

Market clearing identities are equations that transform input data series into appropriate forms for inclusion in the behavioral equations. These adjustments account for changes in price due to inflation and fluctuating exchange rates. Quantities supplied were not adjusted to account for changes in population due to the relatively short time span modeled and relatively stable population levels for Japan, Europe, and the U.S. The first 12 market clearing identities included in the model are used to obtain time series for the endogenous variables (Table 2.3). The 13th identity transforms prices into 2008 price.

Allocation Equations

Allocation of pollock fillets to US

The primary market for fillets produced from Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) pollock is the U.S., which received an average of nearly 44% of all fillets produced over 2000-2008. Equation 2.1 represents the quantity of Alaska pollock fillets allocated to the U.S. $\left({}^{fillet}Q_t^{US}\right)$ as a linear function of monthly dummy variables (m_i), the real U.S. price for single frozen pollock fillet blocks $\left({}^{fillet}\breve{P}_t^{US}\right)$, the real price of European pollock fillet imports from the U.S. $\left({}^{fillet}\breve{P}_t^{US\to EU}\right)$, the quantity of pollock fillets produced by the inshore processing sector $\left({}^{fillet}Q_t^{SS}\right)$, the quantity of pollock fillets produced by the at-sea processing sector $\left({}^{fillet}Q_t^{AS}\right)$, the lagged real US import pollock fillet price $\left({}^{fillet}\breve{P}_{t-1}^{IM\to US}\right)$, and the lagged quantity of pollock fillets allocated to the U.S. $\left({}^{fillet}Q_{t-1}^{US}\right)$:

$$\begin{aligned}{}^{fillet}Q_t^{US} &= \beta_{10} + \sum_{i=1}^{11} \beta_{1i} m_i + \beta_{112}\left({}^{fillet}\breve{P}_t^{US}\right) + \beta_{113}\left({}^{fillet}\breve{P}_t^{US\to EU}\right) + \beta_{114}\left({}^{fillet}Q_t^{SS}\right) \\ &+ \beta_{115}\left({}^{fillet}Q_t^{AS}\right) + \beta_{116}\left({}^{fillet}\breve{P}_{t\text{-}1}^{IM\to US}\right) + \beta_{117}\left({}^{fillet}Q_{t\text{-}1}^{US}\right).\end{aligned} \tag{2.1}$$

Although there is no public data on the monthly quantities of U.S. pollock fillets sold within the U.S., a proxy time series was constructed based on input from industry representatives who indicated that most PBO and PBI pollock fillets are sold within 90 days and that deep-skin fillets are sold within 180 days. For each year, the annual volume of pollock fillets allocated to the U.S. was constructed as the difference between total annual fillet production and total annual fillet exports. Monthly production of U.S. pollock fillets was multiplied by a ratio of the annual allocation to the U.S. and total annual production. Sales out of production inventories were based on a smoothing function that assigned 35% of production in time period *t* to sales in time period *t*, 40% to sales in *t+1*, 10% to sales in *t+2*, and 5% to sales in *t+3*, *t+4*, and *t+5*.

Pollock fillets imported into the U.S. are mostly twice-frozen fillets of Russian origin. Therefore lagged real U.S. import pollock fillet price was included in equation 1 to represent the impact of Russian pollock fillet imports on sales of U.S. pollock fillets in the U.S. The lagged quantity of U.S. pollock fillets allocated to the U.S. represents the effect that past fillet sales to the U.S. have on current sales through, for example, establishment of long term contracts with major purchasers.

<u>Allocation of pollock fillets to Europe</u>

The sales volume of U.S. pollock fillets exported to Europe exceeded the volume of pollock fillets retained in the U.S. for the first time in 2002 and has frequently done so since 2004. From 2000-2008, over 49% of U.S. pollock fillets were sold into European markets. Equation 2.2 represents the quantity of U.S. pollock fillet exports to Europe $\left({}^{fillet}Q_t^{US\rightarrow EU}\right)$ as a linear function of monthly dummy variables (m_i), the real price of European pollock fillet imports from the U.S. $\left({}^{fillet}\breve{P}_t^{US\rightarrow EU}\right)$, the real U.S. price (from Urner Barry reports) for single frozen pollock fillet blocks $\left({}^{fillet}\breve{P}_t^{US}\right)$, the lagged quantity of fillets produced by the inshore sector $\left({}^{fillet}Q_{t-1}^{SS}\right)$, and the lagged quantity of fillets produced by the at-sea sector $\left({}^{fillet}Q_{t-1}^{AS}\right)$:

$$
\begin{aligned}
{}^{fillet}Q_t^{US\rightarrow EU} = {} & \beta_{20} + \sum_{i=1}^{11}\beta_{2i}m_i + \beta_{212}\left({}^{fillet}\breve{P}_t^{US\rightarrow EU}\right) + \beta_{213}\left({}^{fillet}\breve{P}_t^{US}\right) + \\
& \beta_{214}\left({}^{fillet}Q_{t-1}^{SS}\right) + \beta_{215}\left({}^{fillet}Q_{t-1}^{AS}\right).
\end{aligned}
\tag{2.2}
$$

Lagged quantities of fillets produced by the inshore and at-sea sectors were used to represent the difference in time between fillet production and their distribution to Europe.

Allocation of pollock surimi to Japan

The primary market for pollock surimi is Japan, which purchased over 63% of total U.S. pollock surimi from 2000-2008. Equation 2.3 models the quantity of pollock surimi imported from the U.S. by Japan $\left({}^{surimi}Q_t^{US\rightarrow JN}\right)$ as a linear function of monthly dummy variables, the real price of Japan pollock surimi imports from the U.S. $\left({}^{surimi}\breve{P}_t^{US\rightarrow JN}\right)$, the two-period lagged quantity of pollock surimi produced in the inshore sector $\left({}^{surimi}Q_{t-2}^{SS}\right)$, the two-period lagged quantity of pollock surimi produced in the at-sea sector $\left({}^{surimi}Q_{t-2}^{AS}\right)$, and the real U.S. price (from Urner Barry reports) for single frozen pollock fillet blocks $\left({}^{fillet}\breve{P}_t^{US}\right)$:

$$\begin{aligned}{}^{surimi}Q_t^{US\rightarrow JN} &= \beta_{30} + \sum_{i=1}^{11}\beta_{3i}m_i + \beta_{312}\left({}^{surimi}\breve{P}_t^{US\rightarrow JN}\right) + \beta_{313}\left({}^{surimi}Q_{t-2}^{SS}\right) \\ &+ \beta_{314}\left({}^{surimi}Q_{t-2}^{AS}\right) + \beta_{315}\left({}^{fillet}\breve{P}_t^{US}\right).\end{aligned} \tag{2.3}$$

Japanese imports of pollock surimi from the U.S. are used in place of U.S. pollock surimi exports to Japan because the latter fails to account for the portion of Japan-bound surimi that is first exported to Korea and held in bonded warehouses for reshipment to Japan. Unlike U.S. export statistics, which treat pollock surimi transshipped through Busan as exports to Korea, Japanese import statistics properly account for U.S. origination of the pollock surimi. In addition, to account for the lag time between production and arrival in Japan, the models uses a two-month lag on surimi production. The real U.S. price (from Urner Barry reports) for single frozen pollock fillet blocks was included to account for the opportunity cost of producing high grade surimi for Japan in terms of forgone production of pollock fillets.

Allocation of pollock surimi to the U.S.

The U.S. was the second most important market for pollock surimi over 2000-2008- when the U.S. share was 21% of U.S. pollock surimi output. Equation 2.4 expresses the quantity of U.S. pollock surimi allocated to the U.S. $\left({}^{surimi}Q_t^{US}\right)$ as a linear function of monthly dummy variables, the real price of all surimi imported into the U.S. $\left({}^{surimi}\breve{P}_t^{US}\right)$, the quantity of pollock surimi produced in the inshore sector $\left({}^{surimi}Q_t^{SS}\right)$, the quantity of pollock surimi produced in the at-sea sector $\left({}^{surimi}Q_t^{AS}\right)$, the lagged quantity of pollock surimi allocated to the U.S. $\left({}^{surimi}Q_{t-1}^{US}\right)$, and two indicator variables (I_1) and (I_2) used to remove the influence of two months when there were no recorded surimi imports to the U.S.:

$$\begin{aligned} {}^{surimi}Q_t^{US} &= \beta_{40} + \sum_{i=1}^{11} \beta_{4i} m_i + \beta_{412}\left({}^{surimi}\breve{P}_t^{US}\right) + \beta_{413}\left({}^{surimi}Q_t^{SS}\right) + \beta_{414}\left({}^{surimi}Q_t^{AS}\right) \\ &+ \beta_{415}\left({}^{surimi}Q_{t-1}^{US}\right) + \beta_{416}(I_1) + \beta_{417}(I_2). \end{aligned} \tag{2.4}$$

Although there are no public data on monthly quantities of U.S. pollock surimi sold within the U.S., a proxy time series was constructed based on industry input that opined that most surimi is sold within 90 days of its production. For each year, the annual percentage of pollock surimi allocated to the U.S. was estimated as the difference between total U.S. pollock surimi production and the sum of U.S. pollock surimi exports. Based on industry input, the monthly production of pollock surimi was multiplied by the annual percentage and allocated from inventories to sales such that 40% of production in time period *t* was allocated to sales or exports in time period *t* and 40% was allocated to sales in period *t+1*. The residual 20% was allocated to sales and exports in period *t+2*.

Inverse Demand Equations

Inverse demand for pollock fillets in the United States

Equation 2.5 represents the real U.S. price for pollock fillet blocks $\left({}^{fillet}\breve{P}_t^{US}\right)$ as a linear function of monthly dummy variables, the quantity of pollock fillets allocated to the U.S. market $\left({}^{fillet}Q_t^{US}\right)$, the real import price of pollock fillets imported into the U.S. $\left({}^{fillet}\breve{P}_t^{IM\to US}\right)$, the lagged real first wholesale price of pollock fillet block in the U.S. $\left({}^{fillet}\breve{P}_{t-1}^{US}\right)$, and real U.S. per capita disposable personal income $\left(Inc_t^{US}\right)$:

$$
\begin{aligned}
{}^{fillet}\breve{P}_t^{US} = {} & \beta_{50} + \sum_{i=1}^{11} \beta_{5i} m_i + \beta_{512}\left({}^{fillet}Q_t^{US}\right) + \beta_{513}\left({}^{fillet}\breve{P}_t^{IM\to US}\right) \\
& + \beta_{514}\left({}^{fillet}\breve{P}_{t-1}^{US}\right) + \beta_{515}\left(Inc_t^{US}\right).
\end{aligned}
\tag{2.5}
$$

The real import price of pollock fillets imported into the U.S. was used as a substitute for U.S. pollock fillets and is comprised, largely, of twice-frozen pollock fillets harvested in Russia and processed in China.

Inverse demand for pollock fillets in Europe

Equation 2.6 characterizes the real price of U.S. pollock fillet exports to Europe. Where $\left({}^{fillet}\breve{P}_t^{US\to EU}\right)$ is represented as a linear function of monthly dummy variables, the per capita quantity of U.S. pollock fillet exports to the U.S. $\left({}^{fillet}Q_t^{US\to EU}\right)$, the real price of European pollock fillet imports from China and Russia $\left({}^{fillet}\breve{P}_t^{CR\to EU}\right)$, an index of disposable income in Germany $\left(Inc\left(EU€\right)_t^{GE}\right)$, and the exchange rate of euros to U.S. dollar $\left(Ex_t^{€\to\$}\right)$:

$$
\begin{aligned}
{}^{fillet}\breve{P}_t^{US\to EU} &= \beta_{60} + \sum_{i=1}^{11} \beta_{6i} m_i + \beta_{612}\left({}^{fillet}Q_t^{US\to EU}\right) + \beta_{613}\left({}^{fillet}\breve{P}_t^{CR\to EU}\right) \\
&+ \beta_{614}\left(Inc_t^{GE}\right) + \beta_{615}\left(Ex_t^{€\to\$}\right).
\end{aligned} \tag{2.6}
$$

The real price of European pollock fillet imports from China and Russia was chosen as a substitute because Russian pollock fillets provide the most direct competition with Alaska pollock fillets in Europe. Large quantities of those fillets are derived from minimally processed fish shipped to China for reprocessing and shipped into the European market as twice-frozen fillets. An index of disposable income in Germany was chosen because Germany was the largest European importer of U.S. pollock fillets over the modeled time period. The euro to U.S. dollar exchange rate is included to represent the variability in European pollock fillet prices associated with fluctuating exchange rates.

Inverse demand for pollock roe in Japan

No allocation equation was modeled for the Japanese pollock roe market since a comparison of the Japanese imports of pollock roe with total U.S. production of pollock roe indicates that almost 96% of all U.S. pollock roe is exported to Japan. Equation 2.7 models the real price of Japanese pollock roe imports from the U.S. $\left({}^{roe}\breve{P}_t^{US\to JN}\right)$ as a linear function of monthly dummy variables, the quantity of U.S. pollock roe produced $\left({}^{roe}Q_t^{total}\right)$, the real price of Japanese pollock roe imports from China and Russia $\left({}^{roe}\breve{P}_t^{CR\to JN}\right)$, the Japanese index of real consumption expenditures $\left(Inc_t^{JN}\right)$, the Japanese cold storage holdings of pollock roe $\left({}^{roe}S_t^{JN}\right)$, and an indicator variable $\left(I_3\right)$ used to eliminate the influence of one missing observation:

$$
\begin{aligned}
{}^{roe}\breve{P}_t^{US\to JN} &= \beta_{70} + \sum_{i=1}^{11} \beta_{7i} m_i + \beta_{712}\left({}^{roe}Q_t^{total}\right) + \beta_{713}\left({}^{roe}\breve{P}_t^{CR\to JN}\right) + \beta_{714}\left(Inc_t^{JN}\right) \\
&+ \beta_{715}\left({}^{roe}S_t^{JN}\right) + \beta_{716}\left(I_3\right).
\end{aligned} \tag{2.7}
$$

Roe prices are influenced by anticipated Russian and U.S. production and Japanese inventories, because pollock roe is consumed almost exclusively in Japan (American Seafoods Group LLC 2006). As a result, Russian pollock roe prices in Japan and Japanese cold storage holdings of pollock roe have been included in the model to represent their respective impacts on Japanese pollock roe price.

<u>Inverse demand for pollock surimi in Japan</u>

Equation 2.8 describes the real price of Japanese pollock surimi imports from the U.S. $\left({}^{surimi}\breve{P}_t^{US\to JN}\right)$ as a linear function of monthly dummy variables, the quantity of Japanese imports of pollock surimi from the U.S. $\left({}^{surimi}Q_t^{US\to JN}\right)$, the real price of all other surimi imported into Japan $\left({}^{surimi}\breve{P}_t^{other\to JN}\right)$, the real two-period lagged price of Japanese pollock surimi imports from the U.S. $\left({}^{surimi}\breve{P}_{t-2}^{US\to JN}\right)$, the Japanese index of real consumption expenditures $\left(Inc_t^{JN}\right)$, and the three-period lagged Japanese cold storage holdings of surimi $\left({}^{surimi}S_{t-3}^{JN}\right)$:

$$\begin{aligned} {}^{surimi}\breve{P}_t^{US\to JN} &= \beta_{80} + \sum_{i=1}^{11} \beta_{8i} m_i + \beta_{812}\left({}^{surimi}Q_t^{US\to JN}\right) + \beta_{813}\left({}^{surimi}\breve{P}_t^{other\to JN}\right) \\ &+ \beta_{814}\left({}^{surimi}\breve{P}_{t-2}^{US\to JN}\right) + \beta_{815}\left(Inc_t^{JN}\right) + \beta_{816}\left({}^{surimi}S_{t-3}^{JN}\right). \end{aligned} \tag{2.8}$$

The real two-period lagged Japanese pollock surimi import price is used to capture unknown market forces that affect the Japanese surimi price. The three-period Japanese cold storage holdings of surimi is included to reflect its impact on price in subsequent periods because negotiations over the price of surimi between the United States Surimi Commission and Japanese surimi processors often take place before the season begins; therefore, current prices reflect to some degree the cold storage holdings of prior periods.

Inverse demand for pollock surimi in the United States

Equation 2.9 represents the real wholesale price of U.S. pollock surimi in the U.S. $\left({}^{surimi}\breve{P}_t^{US}\right)$ as a linear function of monthly dummy variables, the quantity of U.S. pollock surimi allocated to the U.S. $\left({}^{surimi}Q_t^{US}\right)$, the real price of halibut in the U.S. $\left({}^{halibut}P_t^{US}\right)$, the lagged real wholesale price of U.S. pollock surimi in the U.S. $\left({}^{surimi}\breve{P}_{t-1}^{US}\right)$, the real U.S. per capita disposable personal income $\left(Inc_t^{US}\right)$, the real price of U.S. pollock surimi exports to Europe $\left({}^{surimi}\breve{P}_t^{US\rightarrow EU}\right)$, the four period lagged real wholesale price of U.S. pollock surimi in the U.S $\left({}^{surimi}\breve{P}_{t-4}^{US}\right)$ and two indicator variables $\left(I_4 \text{ and } I_5\right)$:

$$
\begin{aligned}
{}^{surimi}\breve{P}_t^{US} = {} & \beta_{90} + \sum_{i=1}^{11} \beta_{9i} m_i + \beta_{912}\left({}^{surimi}Q_t^{US}\right) + \beta_{913}\left({}^{halibut}\breve{P}_t^{US}\right) \\
& + \beta_{914}\left({}^{surimi}\breve{P}_{t-1}^{US}\right) + \beta_{915}\left(Inc_t^{US}\right) + \beta_{916}\left({}^{surimi}\breve{P}_t^{US\rightarrow EU}\right) \\
& + \beta_{915}\left({}^{surimi}P_{t-4}^{US}\right) + \beta_{918}\left(I_4\right) + \beta_{919}\left(I_5\right).
\end{aligned}
\tag{2.9}
$$

The allocation of pollock surimi to the U.S. has varied widely, ranging from 34% of production in 2002 to 6% in 2005. Because there is no public time series of U.S. surimi prices, the model instead assumes that the U.S. wholesale pollock surimi price is proportional to the U.S. import price of all surimi. The model uses the import price of all surimi rather than just pollock surimi because most of the surimi purchased by the U.S. market is intermediate and recovery grade, and U.S. surimi purchasers do not generally place a premium on pollock products. The real one-period and four-period lagged U.S. surimi pollock import price is used to reflect autocorrelation that represents the role of long term contracts and establishment of relationships with major buyers. The indicator variables are used to account for two periods, February, 2001 and May, 2006, for which there were no observations of first wholesale prices in the U.S. import price of all surimi data set.

Roughly 10% of pollock surimi produced in the U.S. was exported to Europe during 2000 to 2008 period. A majority of that quantity was exported in later years when U.S. exports of pollock surimi to Europe have approached and, in 2009, exceeded exports to Japan. Because this is a recent development, there were not observations to model the emergence of this market. Instead, the model includes the real price of European pollock surimi imports from the U.S. to represent the increasing importance of Europe as a market for U.S. pollock surimi.

Total pollock revenue

The model was designed to highlight trade flows and product demands that are the most influential markets for U.S. pollock. Quantities and prices from the five most important markets were estimated as part of a simultaneous equation system. While not explicitly represented in the estimated equation system, the first wholesale value of pollock products can be derived from estimates of prices and allocations from the primary markets and used to produce estimates of real first wholesale pollock revenues. Equation 2.10 represents real first wholesale pollock revenues $\left(TR_t^{Pollock}\right)$ as the sumproduct of the U.S. pollock fillet allocation and the U.S. pollock fillet price, European pollock fillet imports from the U.S. and the European import price of U.S. pollock fillets, Japanese pollock surimi imports from the U.S. and the Japanese import price of U.S. pollock fillets, the U.S. allocation of pollock surimi and the U.S. surimi price, and, the Japanese imports of U.S. pollock roe and the Japanese import price of U.S. pollock roe:

$$
\begin{aligned}
TR_t^{Pollock} &= \left({}^{fillet}Q_t^{US}\right)*\left({}^{fillet}\tilde{P}_t^{US}\right)+\left({}^{fillet}Q_t^{US\to EU}\right)*\left({}^{fillet}\tilde{P}_t^{US\to EU}\right) \\
&+\left({}^{surimi}Q_t^{US\to JN}\right)*\left({}^{surimi}\tilde{P}_t^{US\to JN}\right)+\left({}^{surimi}Q_t^{US}\right)*\left({}^{surimi}\tilde{P}_t^{US}\right) \\
&+\left({}^{roe}Q_t^{US\to JN}\right)*\left({}^{roe}\tilde{P}_t^{US\to JN}\right).
\end{aligned}
\tag{2.10}
$$

Coefficient estimates and model performance

Coefficient estimates for the system of nine equations were obtained using the open source program Systemfit in the R programing language (Henningsen and Hamann 2007). Systemfit uses an iterative three-stage least squares (3SLS) approach (Zellner and Theil 1962). All nine equations in the specified system are over-identified. Consequently an indirect least squares estimator could not be used. While two-stage least squares (2SLS) and 3SLS are possible options, 2SLS assumes that there is no covariance among equations. Because the disturbances were expected to be contemporaneously correlated, an iterated 3SLS approach is preferred (Zellner and Theil 1962; Henningsen and Hamann 2007). Coefficient estimates and corresponding asymptotic p-values are included in Table 2.4.

The preferred method of evaluating a system of equations for its predictive accuracy is to look at goodness-of-fit (GOF) statistics over the estimation time period. Examination of individual equations does not provide information for the overall system performance, nor does it provide information on how the equations interact. The use of model simulation provides greater insight into the intertemporal and intratemporal linkages present within the model. Historic dynamic simulations were conducted for 2000 -2008 time period. The GOF statistics reported include the coefficient of variation (cv), the correlation between the actual and predicted values of the endogenous variables (r), and the Theil inequality coefficient ($U1$) (Theil 1966).

Conversion of Pollock TAC to Allocation Equations

It is necessary to relate ranges of TAC levels to their respective production of roe, fillet, and surimi, which are then used with the supply and demand model estimated coefficients to conduct a comparative static simulation. Relating surimi and fillet production to catch requires several considerations. First, flesh recovery from pollock for fillets and surimi is largely dependent on fish size. Age-3 and age-4 pollock, which average 345 g to 548 g, are considered ideal for producing surimi. Larger fish are ideal for producing fillets. Catches of small fish can decrease recovery from an average of 29% to 31% to an average of as little as 24% to 25%. Recovery rates can be further skewed when the catch includes large numbers of very small fish (age-2), which end up being ground into fishmeal. . Pollock larger than 750 g tend to yield lower grade surimi because their flesh strength declines (S. Wilt, pers. comm.). As a result, changes in the size distribution of the catch can significantly affect the mix of processed products independent of market considerations.

Another consideration is that there are limits to the flexibility that processors have in shifting between fillet and surimi production. Trimmings and stickwater, along with small fish, can be used to produce surimi but cannot be shifted into fillets (Park 2005, D. Christensen, pers. comm.; J. Jacobs, pers. comm.; D. Abbasian, pers. comm.). Consequently, a portion of the total recovery will invariably go into surimi. Product flexibility is also limited by long-term contracts, which can constrain processors from responding to short-term changes in demand. Additional technical constraints arise in limits to the interchangeability of processing lines. Processors typically maintain dedicated lines devoted to either surimi or fillets, with additional lines that are able to process either. Some minimum amount of pollock must be processed through the surimi lines to avoid shutdown or reductions in surimi quality. Time spent in fish holds before processing also affects flesh recovery and product quality, thus increased travel from fishing grounds in the B-season negatively impacts flesh recovery in shore-based processors and leads to an increase in surimi production relative to fillet production.

Flesh recovery rates were calculated for inshore and at-sea (CP and mothership) sectors and by season (A and B) for the 2007 fishing season based on production found in source 4 of Table 2.1 and harvests recorded in NMFS (2010) . Catches by the *Ocean Phoenix* were not included in the at-sea harvest because the *Ocean Phoenix* produces H&G pollock instead of fillets. Incidental catches of pollock in non-target fisheries were also omitted because they are a small component of total catch that enters the market in low-valued product forms. Based on these assumptions, the A-season flesh recovery rate was 25.8% for the inshore sector and 24.5% for the at-sea sector. B-season recovery rates were 25.2% for the inshore sector and 26.8% for the at-sea sector. To account for the production of recovery grade surimi that cannot be alternatively used as fillets, we have assigned a production rate of 4.25%, equivalent to the ratio of surimi produced that did not go into the Japan market and the sum of BSAI catches in 2007. Based on discussions with industry representatives, one third of the remaining flesh recovery was allocated to surimi and one third was allocated to fillets. The balance was allocated according to highest price—surimi exports to Japan, fillet exports to Europe, or U.S. fillet sales. Roe recovery rates were based on the 2007 season. During the A-season, roe recovery rates were modeled as 4.12% for the inshore sector and 4.93% for the at-sea sector. Roe recovery in the B-season was modeled as 0.60% for the inshore sector and 0.38% for the at-sea sector.

Price differences between sectors

To examine sector specific revenues within the comparative static simulations, it was necessary to differentiate product values between the at-sea and inshore sectors. Differences between surimi prices in the inshore and at-sea sectors can be substantial. Market reports suggest that average prices differ by 20% to 33% in favor of at-sea product. Based on Hiatt et al. (2010), surimi produced at sea was assumed to enjoy a 23% price premium. Fillet prices were treated as equal between the sectors; while the inshore sector has greater flexibility in product forms, the at-sea sector produces a higher proportion of high-value deep-skin fillets.

Roe prices reported in Hiatt et al. (2010) do not represent actual transaction prices. So, data from 1,752 actual transactions (from 2000 to 2006 and 2008) were used to model transaction price as a log-linear function of the year of the transaction, harvest sector (1 if at-sea, 0 for inshore), season (1 if B-season, 0 if A-season), and grade (1 for standard quality, 0 for lower grades):

$$ln\left({}^{Roe}P_t^{BANR}\right) = Y_t + S_t^{at-sea} + B_t^{Season} + G_t^{standard}. \tag{2.11}$$

The transactions used to estimate the parameters of equation 11 represented 45% (82,914 mt) of the 181,242 mt of roe produced from 2000 to 2006 and in 2008. The data were compiled from BANR market reports over 2000-2006, and Seafood News reports in

2008, and included a variety of factors that contributed to the determination of the different values of different characteristics of the roe. A weighted least squares approach was used to account for differences in the volumes of reported transactions. The log-linear functional form was used to represent percent changes in price associated with processing roe in the at-sea and inshore sectors. The model was tested with the at-sea transactions subdivided into mothership and CP sectors, with roe harvests in the mothership sector demonstrating a stronger effect (0.28 versus 0.22). The final model results indicate that the model performed reasonably well (R^2 = 0.71), and that the expected additional value derived from harvesting pollock at-sea is 23.5%; this estimated price differential was applied to the roe prices used for the at-sea sector.

Comparative Static Simulation

Conditions reflective of 2007 were used as a basis for simulations and sensitivity analyses of revenue because it preceded the 2008-2010 recession and because the B-season inshore TAC was under-harvested due to a large TAC, low-surimi prices, high fuel prices, and catch-per-unit-effort declined near the end of the season. The simulations are structured around first wholesale revenues, rather than ex-vessel prices because ex-vessel prices are not defined for CPs and because exvessel transaction data on the mothership sector is confidential due to the small number of firms. In addition, the available exvessel data fail to account for roe bonuses, end-of-year profit sharing bonuses, vertical integration between processors and the owned or leased catcher-vessels that deliver to them, and lease and profit sharing arrangements that have emerged under the AFA cooperative and CDQ structures.

Results

Allocation Equations

Coefficient estimates with corresponding p-values and summary statistics for individual equations (equations 1-9) in the market model are contained in Table 2.4. The estimated allocation of U.S. pollock fillets to the U.S. (equation 1) accounts for nearly all ($R^2 = 0.96$) of the observed variation and the estimated coefficients on all explanatory variables included in the equation were statistically significant at a 1% level (p-value<0.01). The allocation of pollock fillets to the U.S. is inelastic to variations in prices in the U.S. and Europe: a 1% increase in U.S. price of U.S. pollock fillets leads to a 0.48% increase in the allocation of U.S. pollock fillets to the U.S. while a 1% increase in the European price of U.S. pollock fillets leads to a 0.31% decrease in the allocation of U.S. pollock fillets to the U.S. Although the allocation of U.S. pollock fillets to the U.S. is affected by fluctuations in U.S. and European market prices, some U.S. buyers have long-term contracts and depend on pollock regardless of short-term fluctuations in price. Moreover, in interviews, U.S. pollock processors indicated that a majority of their fillet output is pre-sold and thus unresponsive to short term price fluctuations. Changes in the production of pollock fillets by the at-sea and inshore sectors have different effects on the allocation of pollock fillets to the U.S. A 1% increase in the production of pollock fillets in the at-sea sector leads to a 0.28% increase in the quantity of pollock fillets allocated to U.S. markets whereas a similar increase in inshore production only leads to a 0.16% increase in the amount of fillets allocated to the U.S., results that are likely due to higher fillet recovery rates in the at-sea sector that stem from fresher product. Additionally, the production responses for both sectors would be higher if lagged allocations had not also been included in the model.

The allocation of U.S. pollock fillets to Europe (equation 2.2) is explained by European and U.S. prices, U.S. production, and seasonal dummy variables. The included variables accounted for most ($R^2 = 0.81$) of the observed variation in exports of U.S. pollock fillets to Europe. The allocation of pollock fillets to Europe is more sensitive to variations in prices in Europe and the U.S than is the allocation of U.S. pollock fillets to the U.S. (equation 2.1). A 1% increase in the European price of U.S. pollock fillets leads to a 1.32% increase in the allocation of U.S. pollock fillets to Europe, while a 1% increase in the U.S. price of U.S. pollock leads to 1.94% decrease in the allocation of U.S. pollock fillets to Europe. European demand for U.S. pollock fillets increased over the time fueled, in part, by appreciation of the euro against the U.S. dollar. In addition, because the European market for U.S. pollock fillets is more recent than the U.S. market, European buyers are less dependent on U.S. pollock. As was found in equation 1, the production response of at-sea and inshore sectors differed. A 1% increase in the production of pollock fillets in the inshore sector leads to a 0.34% increase in the quantity of pollock fillets allocated to European markets while a similar increase in at-sea sector production leads to a 0.64% increase in the quantity of pollock fillets allocated to European markets.

The allocation of U.S. pollock surimi to Japan (equation 2.3) depended on Japanese pollock surimi import prices, U.S. pollock surimi output, European pollock surimi imports, U.S. pollock fillet prices, and seasonal dummy variables. This equation accounted for a large portion ($R^2 = 0.82$) of the observed variation in U.S. pollock allocations to Japan. The amount of pollock surimi exported to Japan was responsive to changes in U.S. pollock fillet prices; a 1% increase in the U.S. pollock fillet price led to a 1.92% decrease in the allocation of U.S. pollock surimi to Japan. This is unsurprising because the high quality U.S. pollock surimi desired in the Japanese market requires high quality pollock meat that would otherwise be used in fillet production. Changes in inshore and at-sea production of pollock surimi had similar effects on the allocation of U.S. pollock surimi to Japan. A 1% increase in production by the inshore sector resulted in a 0.29% increase in the allocation of U.S. pollock surimi to Japan while a similar increase in production by the at-sea sector resulted in a 0.26% increase in the allocation of U.S. pollock surimi to Japan. While this may be surprising, given that most of the highest grade surimi is produced in the at-sea sector, it should be recognized that three of four major shore-based processors, Alyeska, Unisea, and Westward, are subsidiaries of Japanese seafood conglomerates. Consequently the inshore sector can be expected to be particularly influential in determining Japanese imports. The price of U.S. surimi in the U.S. was omitted from this equation because the U.S. market does not appear to be influential in determining the allocation of U.S. surimi to Japan. The U.S. market generally receives intermediate grade surimi, while the Japanese market sources intermediate grade surimi from a variety of fisheries and mostly purchases only the highest grades of pollock surimi from the U.S. Furthermore, the U.S. market appears to act as a secondary market that is able to absorb surimi that would otherwise depress Japanese surimi prices. Consistent with this observation about the role of the U.S. market for surimi, tests of the model with and without the U.S. surimi as an explanatory variable concluded that U.S. surimi prices were not influential in determination of the allocation of surimi to Japan. The lagged Japanese real import price of other (not U.S. pollock) surimi increased by 1% at the mean, the allocation of Japanese imports of U.S. pollock surimi decreased by 0.64%, indicating a strong movement between the market buildup of surimi from other countries and the decreased willingness to pay for lower grade U.S. pollock surimi.

Equation 2.4, the allocation of U.S. pollock surimi to the U.S., also performed well ($R^2 = 0.88$), particularly considering the data were constructed from time series of production and exports adjusted to reflect expert opinion about temporal relationships between production and distribution from cold-storage holdings. Of most importance was the lagged U.S. allocation of U.S. pollock surimi to the U.S., which led to a change of 0.79% in the U.S. allocation of U.S. pollock surimi for every 1% change in the lagged quantity. Although the coefficient on at-sea production was not statistically significant in the equation, the coefficient on inshore production was statistically significant at a 1% level. The inshore sector, with most catches being processed 24 to 72 hours after harvest, produces a lower overall grade of surimi, and consequently, supplies more surimi to the U.S. market than the at-sea sector.

Demand Equations

The U.S. and European inverse demand equations for pollock fillets (equations 2.5 and 2.6) performed well ($R^2 = 0.89$ for equation 2.5 and $R^2 = 0.77$ for equation 2.6). The influence of twice-frozen pollock fillets, lagged U.S. pollock fillet prices, U.S. pollock fillet allocations, and U.S. per capita income were all statistically significant at a 1% level. Changes in the lagged U.S. pollock fillet price had the greatest effect on current

U.S. fillet prices; a 1% change in the lagged price leads to a 0.83% change in the current price. The European pollock fillet import price from Russia and China, the European fillet allocation, and the euro/U.S. dollar exchange rate were statistically significant at a 10% level. Despite their low p-values, these variables were retained in the model because they contributed to performance of the overall equation system. German real disposable income was not statistically significant. The European pollock fillet import price from Russia and China is particularly influential on European pollock prices—a 1% change in the import price engenders a 1.44% change in European imports of U.S. pollock. With the European market initially turning to U.S. pollock fillets in the early 2000s in response to reduced Russian output, the market has become increasingly dependent on the U.S. supply. The high elasticity of U.S. prices to the price of Russian and Chinese imports suggests, however, that a large rise in Russian pollock catches and their subsequent price decrease would have a significant impact on U.S. pollock producers.

The Japanese import price of U.S. pollock roe (equation 2.7) also performed well ($R^2 = 0.76$), with Japanese cold-storage holdings and Japanese imports of pollock roe from other countries both being statistically significant at a 1% level (p-value <0.01). Although interviews with industry members discounted the reliability of Japanese cold-storage holdings data, it appears that the monthly reported values reflect factors that influence purchasers' perceptions. The model found that a 1% change in cold-storage holdings led to a 1.2% change in roe prices, which accords with industry reports (e.g., BANR) that have suggested that cold storage holdings are an important factor in the determination of roe auction prices. On the other hand, Japanese roe consumption statistics, which were considered important by industry members in determining the direction of the market, where not found to be statistically significant and did not provide theoretically consistent results. Changes in Japanese cold-storage holdings appear to reflect other underlying market influences not specifically modeled in the equation. For example, demand for pollock roe appears to be declining—more is being sold at grocery stores rather than specialty shops. Although similar quantities of pollock roe continue to be consumed, the premium ascribed to the product has declined along with prices.

Equation 2.8, describing the Japanese import price of U.S. pollock surimi performed well ($R^2 = 0.80$). Statistically significant variables included the Japanese allocation of U.S. surimi, the Japanese price of non-U.S. surimi, lag-three Japanese cold-storage holdings, and lag-two Japanese import price of U.S. surimi. The Japanese price for U.S. pollock surimi involves negotiations between the United States Surimi Commission and Japanese buyers that often extend over several months. Prices are often agreed to before fishing begins, thus the importance of including a two-month lag for Japanese import price and a three-month lag on Japanese cold-storage holdings. As was the case for the Japanese roe demand equation, Japanese consumption of surimi was dropped from this equation because it was not statistically significant and exhibited theoretically implausible behavior. Because Japanese cold storage holdings of pollock surimi are moderately collinear with Japanese surimi consumption, omission of the consumption statistics could confound estimates of the influence of cold-storage holdings but should not adversely affect estimates of Japanese demand for U.S. pollock surimi. An increase of 1% in the Japanese price of non-U.S. surimi imports is estimated to lead to a 0.69% increase in the price of Japanese imports of U.S. pollock surimi, underscoring Japanese consumers' decreased willingness to pay for high-quality/high-priced U.S. pollock surimi. The Japanese index of real disposable income, while not statistically significant (p-value = 0.50), consistently provided a negative impact on Japanese surimi prices during sensitivity analyses, consistent with the behavior of an inferior good. Surimi appears to be a substitute for higher priced seafoods and according to industry members, surimi demand increases during weak economic periods. This was the case in the latter half of 2008 at the onset of the global market crisis, when Japanese surimi prices increased.

The U.S. price of U.S. pollock surimi (equation 2.9) did not perform as well as the other eight equations ($R^2 = 0.56$). This was likely due, in part, to the lack of specific data on domestic sales and inventories. Moreover, the U.S. surimi market is the least important of the five markets modeled, and as such, poor fit in this equation does not greatly influence overall fit of the equation system or adversely affect performance of other modeled relationships. Similar to the role of income in the Japanese pollock surimi demand equation, there is a negative coefficient associated with U.S. per capita disposable income, consistent with the expected behavior of an inferior good, except that in this case, the estimated coefficient is statistically significant. As described in equation 2.4, the U.S. market for surimi fluctuates widely, with surimi generally sold as a substitute for higher priced seafood products such as crab, lobster, and scallops. Consequently a 1% decrease in the U.S. per capita disposable income is associated with a 2.49% increase in the price of U.S. pollock surimi. Halibut (*Hippoglossus stenolepsis*) was chosen as a substitute for other seafoods; a 1% increase in the price of halibut was found to lead to a 0.39% increase in the price of surimi.

Goodness of Fit Statistics

The GOF statistics show that the model fits the data fairly well (Table 2.5). The lowest correlation between actual and estimated values of the dependent variables was 0.75 (U.S. pollock surimi prices), while six of the correlation coefficients were 0.90 or greater. In addition, the correlation between actual and estimated total pollock revenue was 0.97. The coefficient of variation suggested a little more variability between equations, particularly in the allocation equations, varying from 3.7% in the U.S. pollock fillet price equation to 47.0% in the European fillet import equation. The Theil $U1$-statistics indicate that the model provides a reliable fit to the historical data, with statistics for individual equations ranging from a low of 0.03 in the U.S. pollock fillet price equation to a high of 0.31 in the Europe fillet import equation. Although the GOF statistics show reduced reliability in equations 2, 3, and 4, the overall results were favorable. Overall U.S. pollock revenue from the five product markets was particularly successful, with a cv of 14.2% and Theil's $U1$ equal to 0.12, indicating that errors in the individual equations did not harm the overall predictive capability of the system of equations.

Discussion

In 2007, 1.332 million metric tons (mmt) of pollock was harvested from the EBS. This catch had a first wholesale value of $1.170 billion and an average value per kg of $0.91. Model estimates of $1.189 billion in first wholesale value and an average value per kg of $0.93/kg do not differ significantly or appreciably from the observed values.[3] Based on the estimated relationship, revenue from roe, fillets, and surimi would be maximized at a harvest level of 4.987 mmt (Figure 2.1). The BSAI pollock stock has never been and seems unlikely to ever be large enough to support a TAC larger than 1.5 mmt, thus it seems likely that the fishery will operate in an inelastic portion of the combined demand for surimi, fillets, and roe. In contrast, Herrmann et al. (1996) found that surimi revenue in the pre-AFA pollock fishery was maximized when harvests were 1.7 mmt. The difference could be from the shift in the pollock fishery's focus since the passage of the AFA or a reflection of the importance of fillet and roe as components of the demand for pollock. Instead of maximizing revenue by maximizing catch, industry looks to produce the highest return per kilogram harvested. Consistent with Fell (2008), processors are now able to shift production into different products to respond to market demand. In addition, the ability to diversify over different products and new markets could explain why the fishery appears to be less vulnerable to year-to-year changes in the pollock TAC and resultant shifts in the supply of pollock available for allocation to various markets and product forms.

Pollock revenue also varies widely by sector. For example, at a TAC of 1.394 mmt (the 2007 TAC), under conditions such that all the TAC is harvested, inshore wholesale revenue is estimated to be $553.1 million dollars and at-sea sector wholesale revenue is estimated to be $740.5 million (Figure 2.2). Under those same conditions and with CDQ

[3] The price ($/kg) excludes catches and production in 2007 associated with the mothership *Ocean Phoenix*, which produces headed & gutted fish rather than surimi or fillets.

ownership reflecting their 2008 shares in the inshore and at-sea sectors, CDQ entities would have received over $311.8 million—over 24% of the total first wholesale revenue generated in this fishery. Estimates of revenue per kilogram caught of $0.91 for the inshore sector and $1.04 for the at-sea sector indicate that the at-sea sector maintains a 15% advantage in value per kg relative to the inshore sector[4]. While this indicates a differential value of $84.0 million over the 610,739 mt allocated to the inshore sector in 2007, the differential is smaller than the $0.34/kg that at-sea vessels paid to lease CDQ shares in 2007. Since 2000, virtually the entire CDQ quota has been leased to the at-sea sector because that sector is willing to offer higher lease prices and other benefits to their CDQ partners, which is a consequence of the increased value that can be derived from harvesting and processing at-sea. Because the cost structures of the inshore and at-sea sectors are unknown the magnitude of differences in net revenues could be larger or smaller than the estimated differences in gross revenues. In addition, there may be important heterogeneities in costs and revenues among the vessels or firms that operate in the inshore and at-sea sectors. Despite this lack of direct information about the cost structure of the inshore and at-sea sectors, the 2007 season provides indirect information about absolute costs in the inshore sector and relative costs in the at-sea sector. In 2007, in face of unanticipated high fuel costs, the inshore sector left 10% of its B-season quota unharvested. The at-sea sector harvested its entire B-season quota as well as the entire CDQ quota. Since the model indicated the at-sea sector maintained a $0.10/kg advantage over the inshore sector but the CDQ quota cost of $0.34/kg, there are a few options, or a combination thereof, that explain why the at-sea sector continued to harvest their allocation. Moreover, industry experts suggest that the at-sea sector maintains a lower per-unit operating cost structure across the combination of harvesting and processing that allows them to continue harvesting pollock even though their increased $/kg does not cover the CDQ costs. It is also possible that the at-sea sector receives a larger price

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[4] This and all subsequent $/kg curves calculated for this paper assume all pollock is harvested, exclude *Ocean Phoenix* harvest and production, and include the value of all fillet, surimi, and roe produced.

differential than is estimated within this model or that the at-sea sector may benefit from efficiencies of scale by harvesting the CDQ pollock in addition to the at-sea sector allocation.

Under the AFA, the U.S. pollock fishery has grown in financial value and experienced unparalleled stability. Operating under the current cooperative structure, pollock processors have been able to rapidly expand into new markets, optimize first wholesale revenues across a mix of roe, fillets, and surimi, and maximize recovery rates among a suite of product forms. The elevated revenues and overall stability have allowed companies to weather poor economic conditions, including the conditions in the 2007 B-season that led to a 10% under-harvest of the inshore sector quota.

Despite the pollock fishery's relative strong financial condition under the AFA, key challenges lie ahead. Russian pollock harvests have been trending upward since 2002 and can be expected to exert increased downward pressure on pollock prices. If the Russian pollock fishery wins Marine Stewardship Council certification as a sustainable fishery, the price premium and enhanced access to western European markets offered to U.S. pollock products may be reduced. A mere 10% decline in pollock prices would have caused a \$130 million decline in gross revenue in 2007, decreases of \$74 million to the at sea sector, \$55 million to the inshore sector, and \$31 million to the CDQs. Continuation of recent trends in Japanese consumer preferences appears likely to exert downward pressure on prices for high-grade surimi and roe. A combined downturn of 20% in surimi and roe prices would have wiped out nearly 10% of the total first wholesale revenue the pollock fishery derived from roe, fillets, and surimi in 2007.

Increases in the EBS TAC are estimated to have a relatively small impact on the projected revenue. Under 2007 conditions, over the range of past BSAI pollock TACs of 0.813 mmt to 1.502 mmt, the estimated price changes from \$0.988/kg to \$0.913/kg, a difference that is likely to be offset, in part, by decreased variable costs as vessels take fewer trip or as companies stack their quota on fewer vessels. With the fishery operating in the inelastic portion of the demand curve, it makes economic sense to maximize catch. This inelasticity will also help to minimize the impact of increased Russian harvests.

However, the inshore sector appears to be vulnerable to reductions in first wholesale prices and increases in fuel costs, especially during the B-season, where under conditions such as were present in 2007, first wholesale value declines from \$0.814/kg to \$0.785/kg. Such a drop in value could again lead the inshore sector to under-harvest a portion of their B-season catch share or to incur short-term loss in order to satisfy contracted deliveries.

With all the turmoil the U.S. pollock fishery has endured over its short 35-year history, the expected conditions seen in the future appear relatively benign. The fishery has endured far greater challenges than short-term potential losses to a single sector. The current management, governance, and market structures have played vital roles in the success of the BSAI pollock fishery. It remains to be seen, however, with rising fuel prices, ongoing restrictive Steller sea lion protection measures, and changes in the timing and location of fishing that will result from new regulatory requirements in 2011 to restrict Chinook salmon bycatch and impending measures to restrict non-Chinook salmon bycatch, if the inshore sector's B-season quota will remain profitable. The AFA, despite all its positive impacts, does not provide the flexibility to adapt to these potential changes. With that the possibility of increased shares of the TAC left unharvested, amending the AFA to allow leasing pollock catch shares between sectors could be to the advantage of both sectors and to the CDQ entities and the western Alaskans they represent.

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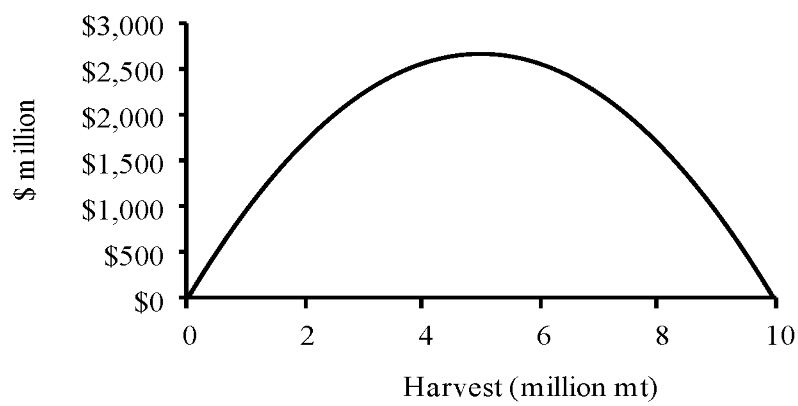

Figure 2.1. Simulated 2007 BSAI pollock wholesale revenue curve.

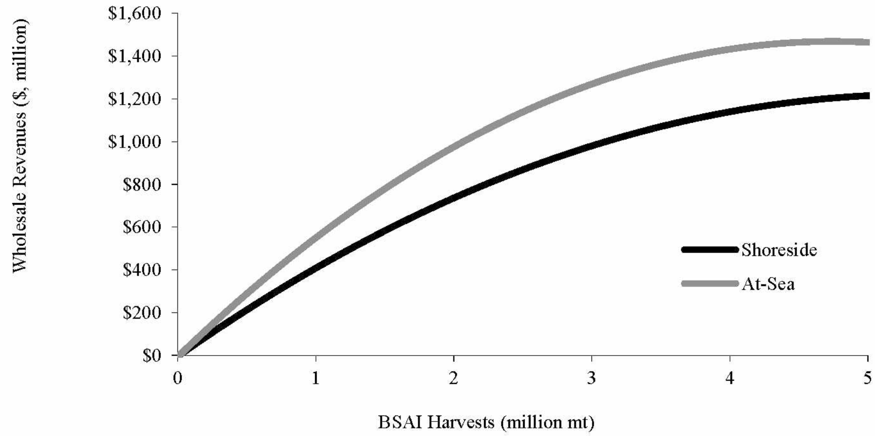

Figure 2.2. Simulated 2007 BSAI pollock wholesale sector revenue curve.

Table 2.1. Data sources, frequencies, and ranges

Number	Type	Description	Source	Frequency & Range
1	Japanese Roe Consumption	Total Value and Quantity Purchased per Household	Trade Statistics of Japan	Monthly, 1999-2008
2	Roe Auction Prices	Seattle Roe Auction Prices	BANR Reports	Intermittent Spring and Fall 1999-2009
3	Japanese Surimi and Roe Cold Storage Holdings	Amount in Inventory	Trade Statistics of Japan	Monthly, 1992 - 2009
4	Roe, Fillet, and Surimi Production	Quantity Produced by Inshore and At-Sea Sector	NOAA, Personal Correspondence	Monthly, 1998-2008
5	Japanese Roe Import Quantity and Price	Average Price and Quantity of Imports from Russia, U.S., and Korea	Trade Statistics of Japan	Monthly, 1999- 2008
6	Japanese Surimi Import Quantity and Price	Average Price and Quantity of Imports from all Countries	Trade Statistics of Japan	Monthly, 2000-2008
7	U.S. Surimi Import and Export Quantity and Price	Average Price and Quantity for Individual and Total Countries	United States International Trade Commission	Monthly, 1992 – 2009
8	U.S. Fillet Price	66lb block, $/kg	Urner Barry	Monthly, 1998-2008
9	U.S. Fillet Export and Import Quantity and Price	Average Price and Quantity for Individual and Total Countries	United States International Trade Commission	Monthly, 1992- 2009
10	European Fillet and Surimi Import Quantity and Price	Average Price and Quantity of Imports from U.S., Russia, China, and Japan	Eurostat	Monthly, 1999-2009
11	U.S. per capita Income	Real Terms	Bureau of Labor Statistics	Monthly, 1999-2008
12	Japanese index of real consumption expenditures	Real Terms	Trade Statistics of Japan	Monthly, 1999-2008
13	German per capita Income	Real Terms	Eurostat	Monthly, 1999-2008
14	U.S. Halibut Fillet Prices	10 to 20 lb., $/kg	Urner Barry	Monthly, 1998-2008
15	U.S. Producer Price Index	Intermediate Foods and Feeds	Bureau of Labor Statistics	Monthly, 1998-2008
16	Exchange Rates	Dollar, Yen, and Euro	Board of Governors of the Federal Reserve	Monthly, 1998-2008

Table 2.2. Variable definitions and sources

Variable	Definition	Source
${}^{fillet}Q_t^{US}$	Quantity of pollock fillets allocated to the U.S.	4, 9
${}^{fillet}P_t^{US}$	U.S. Urner Barry price of single frozen pollock fillet block	8
${}^{fillet}P\left(EU€\right)_t^{US\rightarrow EU}$	European import price of pollock fillets	10
${}^{fillet}Q_t^{SS}$	Quantity of pollock fillets produced by the inshore sector	4
${}^{fillet}Q_t^{AS}$	Quantity of pollock fillets produced by the at-sea sector	4
${}^{fillet}P_t^{IM\rightarrow US}$	Price of U.S. pollock fillet imports	9
${}^{fillet}Q_t^{US\rightarrow EU}$	U.S. pollock fillets exports to Europe	9
${}^{surimi}Q_t^{US\rightarrow JN}$	Quantity of Japanese pollock surimi imports from the U.S	6
${}^{surimi}P\left(JP¥\right)_t^{US\rightarrow JN}$	Price of Japanese pollock surimi imported from the U.S.	6
${}^{surimi}Q_t^{SS}$	Quantity of pollock surimi produced in the inshore sector	4
${}^{surimi}Q_t^{AS}$	Quantity of pollock surimi produced in the at-sea sector	4
${}^{surimi}Q_t^{US}$	Quantity of U.S. pollock surimi allocated to the U.S.	4, 9
${}^{surimi}P_t^{US}$	Price of U.S. surimi imports	7
Inc_t^{US}	Real U.S. per capita disposable personal income	11
${}^{fillet}P\left(EU€\right)_t^{CR\rightarrow EU}$	Price of European pollock fillet imports from China and Russia	10
$Inc\left(EU€\right)_t^{GE}$	Index of disposable income of Germany in Euros	13
$Ex_t^{€\rightarrow \$}$	Europe-U.S. exchange rate-One Euro to U.S. dollars	16
$Ex_t^{¥\rightarrow \$}$	Japan-U.S. exchange rate-One U.S. dollar to Japanese Yen	16
${}^{roe}P\left(JP¥\right)_t^{US\rightarrow JN}$	Japanese import price of U.S. pollock roe	5
${}^{roe}Q_t^{SS}$	Quantity of pollock roe produced in the inshore sector	4
${}^{roe}Q_t^{AS}$	Quantity of pollock roe produced in the at-sea sector	4
${}^{roe}P\left(JP¥\right)_t^{CR\rightarrow JN}$	Price of Japanese pollock roe imports from China and Russia	5
Inc_t^{JN}	Japanese index of real consumption expenditures	12
${}^{roe}S_t^{JN}$	Japanese cold storage holdings of pollock roe	3
${}^{surimi}S_t^{JN}$	Japanese cold storage holdings of pollock surimi	3
${}^{surimi}P\left(JP¥\right)_t^{other\rightarrow JN}$	Japanese price of surimi imports other than U.S. pollock surimi	6
${}^{surimi}P\left(EU€\right)_t^{US\rightarrow EU}$	Price of European pollock surimi imports from the U.S.	10
${}^{halibut}P_t^{US}$	Price of halibut in the U.S.	14
${}^{roe}Q_t^{US\rightarrow JN}$	Quantity of Japan imports of pollock roe	5
PPI_t^{US}	U.S. producer price index for intermediate foods & feeds (base=1982)	15

Table 2.3. Market clearing identities

1. U.S. pollock fillet price in the U.S.	${}^{fillet}\breve{P}_t^{US} = {}^{fillet}P_t^{US} * {}^{2008}PPI_t^{US}$
2. Europe import price of U.S. pollock fillets	${}^{fillet}\breve{P}_t^{US\to EU} = \left({}^{fillet}P\left(EU€\right)_t^{US\to EU} * Ex_t^{€\to\$}\right) * {}^{2008}PPI_t^{US}$
3. U.S. import price of pollock fillets	${}^{fillet}\breve{P}_t^{IM\to US} = {}^{fillet}P_t^{IM\to US} * {}^{2008}PPI_t^{US}$
4. Japan import price of U.S. pollock surimi	${}^{surimi}\breve{P}_t^{US\to JN} = \left({}^{surimi}P\left(JP¥\right)_t^{US\to JN} / Ex_t^{¥\to\$}\right) * {}^{2008}PPI_t^{US}$
5. U.S. import price of surimi	${}^{surimi}\breve{P}_t^{US} = {}^{surimi}P_t^{US} * {}^{2008}PPI_t^{US}$
6. Europe pollock fillet import price from China and Russia	${}^{fillet}\breve{P}_t^{CR\to EU} = \left({}^{fillet}P\left(EU€\right)_t^{CR\to EU} * Ex_t^{€\to\$}\right) * {}^{2008}PPI_t^{US}$
7. Japan pollock roe import price from U.S.	${}^{roe}\breve{P}_t^{US\to JN} = \left({}^{roe}P\left(JP¥\right)_t^{US\to JN} / Ex_t^{¥\to\$}\right) * {}^{2008}PPI_t^{US}$
8. Total quantity of roe produced	${}^{roe}Q_t^{total} = {}^{roe}Q_t^{SS} + {}^{roe}Q_t^{AS}$
9. Japan pollock roe import price from China and Russia	${}^{roe}\breve{P}_t^{CR\to JN} = \left({}^{roe}P\left(JP¥\right)_t^{CR\to JN} / Ex_t^{¥\to\$}\right) * {}^{2008}PPI_t^{US}$
10. Japanese surimi import price excluding U.S.	${}^{surimi}\breve{P}_t^{other\to JN} = \left({}^{surimi}P\left(JP¥\right)_t^{other\to JN} / Ex_t^{¥\to\$}\right) * {}^{2008}PPI_t^{US}$
11. U.S. Urner Barry halibut price	${}^{halibut}\breve{P}_t^{US} = {}^{halibut}P_t^{US} * {}^{2008}PPI_t^{US}$
12. Europe import prices of U.S. pollock surimi	${}^{surimi}\breve{P}_t^{US\to EU} = \left({}^{surimi}P\left(EU€\right)_t^{US\to EU} * Ex_t^{€\to\$}\right) * {}^{2008}PPI_t^{US}$
13. 2008 producer price index for intermediate food & feeds	${}^{2008}PPI_t^{US} = PPI_t^{US} / {}^{2008Mean}PPI^{US}$

Table 2.4. Coefficient estimates with corresponding p-values (in parentheses) and summary statistics

Equation	β_{n0}	β_{n1}	β_{n2}	β_{n3}	β_{n4}
1	-3,334,730 (0.00)	-91,632 (0.79)	-359,214 (0.44)	633,345 (0.11)	-67,905 (0.84)
2	4,579,960 (0.09)	-552,692 (0.66)	2,747,550 (0.04)	-2,150,530 (0.23)	-6,363,480 (0.00)
3	18,244,300 (0.00)	231,429 (0.90)	981,453 (0.61)	9,281,380 (0.00)	2,529,950 (0.20)
4	-1,937,260 (0.00)	-352,360 (0.54)	-481,554 (0.62)	1,914,120 (0.02)	3,420,430 (0.00)
5	-1.285 (0.01)	-0.018 (0.78)	0.104 (0.14)	0.084 (0.28)	0.014 (0.83)
6	-3.123 (0.00)	0.047 (0.70)	0.091 (0.51)	0.210 (0.18)	-0.141 (0.26)
7	6.968 (0.77)	1.373 (0.55)	4.923 (0.31)	9.153 (0.02)	7.760 (0.00)
8	2.437 (0.18)	-0.462 (0.02)	-0.378 (0.04)	0.425 (0.05)	0.361 (0.16)
9	4.960 (0.03)	0.075 (0.81)	-0.0024 (0.99)	0.183 (0.58)	0.680 (0.05)

Equation	β_{n5}	β_{n6}	β_{n7}	β_{n8}	β_{n9}
1	-909,894 (0.00)	-44,909 (0.90)	-57,792 (0.91)	367,504 (0.47)	-259,613 (0.57)
2	-738,716 (0.55)	-159,983 (0.90)	4,595,410 (0.00)	-1,482,110 (0.46)	-2,630,240 (0.19)
3	-4,356,780 (0.01)	1,284,130 (0.45)	1,642,130 (0.35)	5,109,160 (0.00)	4,865,250 (0.01)
4	-122,711 (0.83)	-715,066 (0.19)	375,974 (0.64)	1,016,020 (0.27)	1,653,210 (0.05)
5	-0.035 (0.59)	-0.012 (0.85)	0.099 (0.18)	0.275 (0.00)	0.197 (0.03)
6	-0.173 (0.16)	-0.171 (0.17)	0.122 (0.43)	0.199 (0.25)	0.306 (0.07)
7	8.185 (0.00)	8.562 (0.00)	8.771 (0.00)	8.022 (0.00)	9.112 (0.00)
8	-0.209 (0.20)	-0.229 (0.19)	-0.259 (0.14)	-0.032 (0.85)	0.226 (0.32)
9	-0.295 (0.36)	0.233 (0.45)	0.233 (0.45)	0.183 (0.57)	0.294 (0.41)

Table 2.4 (cont.). Coefficient estimates with corresponding p-values (in parentheses) and summary statistics

Equation	β_{n10}	β_{n11}	β_{n12}	β_{n13}	β_{n14}	β_{n15}
1	-63,099 (0.87)	-323,840 (0.33)	677,624 (0.01)	-494,360 (0.01)	0.158 (0.00)	0.233 (0.00)
2	-3,279,900(0.06)	-2,040,040(0.13)	2,272,130 (0.00)	-2,971,050(0.00)	0.372 (0.01)	0.563 (0.00)
3	5,397,310 (0.01)	406,270 (0.83)	479,587 (0.70)	0.375 (0.00)	0.319 (0.02)	-4,914,180(0.06)
4	1,359,520 (0.03)	755,711 (0.17)	87,489 (0.63)	0.199 (0.00)	0.034 (0.53)	0.783 (0.00)
5	0.144 (0.06)	0.033 (0.62)	-2.5×10^{-8}(0.00)	0.203 (0.00)	0.827 (0.00)	4.6×10^{-5} (0.00)
6	0.195 (0.17)	0.114 (0.36)	-2.0×10^{-8} (0.07)	1.608 (0.00)	7.7×10^{-5}(0.65)	1.065 (0.00)
7	5.996 (0.00)	5.617 (0.00)	-6.0×10^{-7}(0.17)	0.686 (0.00)	0.154 (0.52)	9.1×10^{-7} (0.00)
8	0.459 (0.10)	0.172 (0.38)	-4.8×10^{-8} (0.02)	0.663 (0.00)	0.444 (0.00)	-0.012 (0.50)
9	-0.105 (0.77)	0.179 (0.57)	-2.6×10^{-8} (0.52)	0.183 (0.12)	0.270 (0.00)	0.382 (0.00)

Equation	β_{n16}	β_{n17}	β_{n18}	β_{n19}	df	R^2
1	856,770 (0.00)	0.617 (0.00)			90	0.96
2					92	0.81
3					92	0.82
4	-883,162 (0.46)	783,296 (0.50)			90	0.88
5					92	0.89
6					92	0.77
7	-12.90 (0.00)				91	0.76
8	-2.3×10^{-8} (0.00)				91	0.80
9	-2.0×10^{-4} (0.01)	0.330 (0.00)	0.501 (0.44)	-0.059 (0.93)	88	0.56

Table 2.5. Goodness of fit statistics. CV is the coefficient of variation, r is the correlation between the estimated and predicted values of the dependent variables, and U1 is the Theil inequality coefficient.

Equation	Variable	CV	r	*U*1
2.1	U.S. fillet allocation	13.0%	0.98	0.10
2.2	European fillet allocation	47.0%	0.90	0.31
2.3	Japanese surimi allocation	32.3%	0.90	0.24
2.4	U.S. surimi allocation	34.6%	0.94	0.24
2.5	U.S. fillet demand	3.7%	0.94	0.03
2.6	EU fillet demand	8.0%	0.88	0.07
2.7	Japanese roe demand	23.2%	0.87	0.20
2.8	Japanese surimi demand	11.2%	0.90	0.10
2.9	U.S. surimi demand	26.2%	0.75	0.22
2.10	Total revenue	14.2%	0.97	0.12

General Conclusion

Although the walleye pollock (*Theragra chalcogramma*) fishery has prospered under the AFA, there are a variety of factors that may affect its viability in coming years. Pressure on revenues, stemming from declining Japanese demand for roe and high-quality surimi, could reduce overall revenue and increase fillet production and increase the supply of fillets and surimi to markets in the U.S. and Europe. Rising Russian pollock harvests, coupled with possible MSC certification, will continue to put pressure on pollock values. Management measures, such as those intended to reduce salmon bycatch and to minimize impacts on Steller sea lions (*Eumetopias jubatus*), which cause fishing vessels and catcher processors to travel greater distances from port, increasing operating costs per ton harvested. When coupled with rising fuel prices, it is increasingly likely that portions of the inshore B-season allocation will be left unfished. The inshore sector, which already experiences lower per-pound revenues than the at-sea sector, is also more adversely affected by regulatory actions or changes in the spatial distribution of pollock biomass that force vessels to travel greater distances from port.

Rather than permitting structural impediments to result in under-harvests prohibitions on leasing or transfers between sectors could be amended. However, because the NPFMC lacks authority to amend the AFA, any change would require Congressional action. Allowing leasing between sectors could provide increased revenues for inshore and at-sea sectors as well as consumers who would benefit from increased supplies of surimi and fillets.

In addition, because CDQ entities are invested in the inshore and at-sea sectors, amendment of the AFA to allow intersectoral transfers and thereby increase the likelihood that the full TAC will be harvested thereby increasing the likelihood that the CDQ entities will fully benefit from their ownership shares in the inshore and at-sea sectors. CDQ entities rely heavily on royalty payments from leasing their pollock allocation and revenue obtained from their investments on the pollock fishery to offset the cost of subsidizing community-based salmon (*Oncorhynchus spp.*) and halibut (*Hippoglossus stenolepis*), fisheries and their investments and contributions to infrastructure and community development. Allowing intersectoral transfers is unlikely to affect the size of CDQ royalties, but the expected value of their capital investments could be significantly increased.